OLOGY DEPT.

Gas Journal

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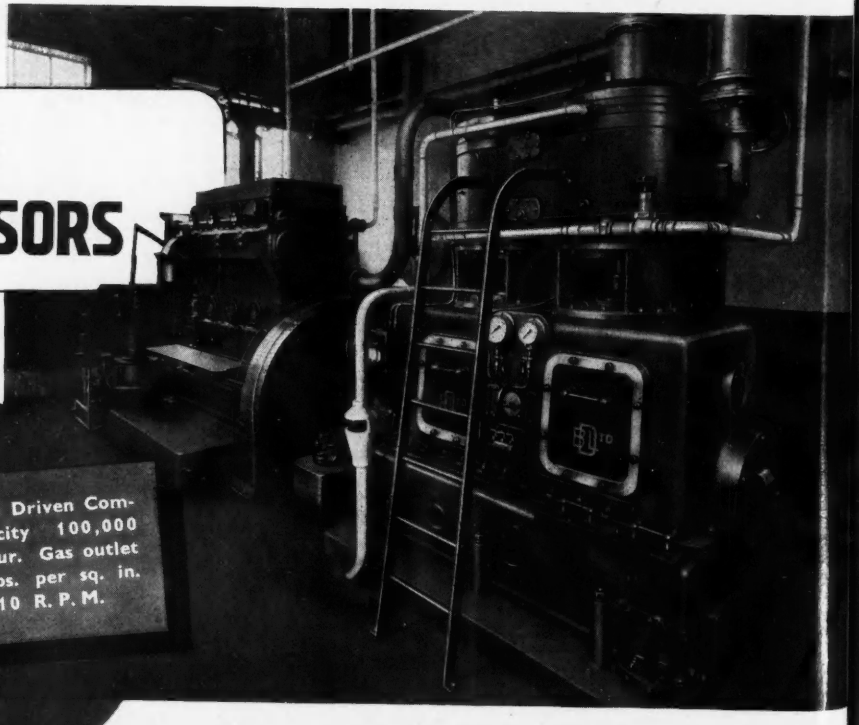

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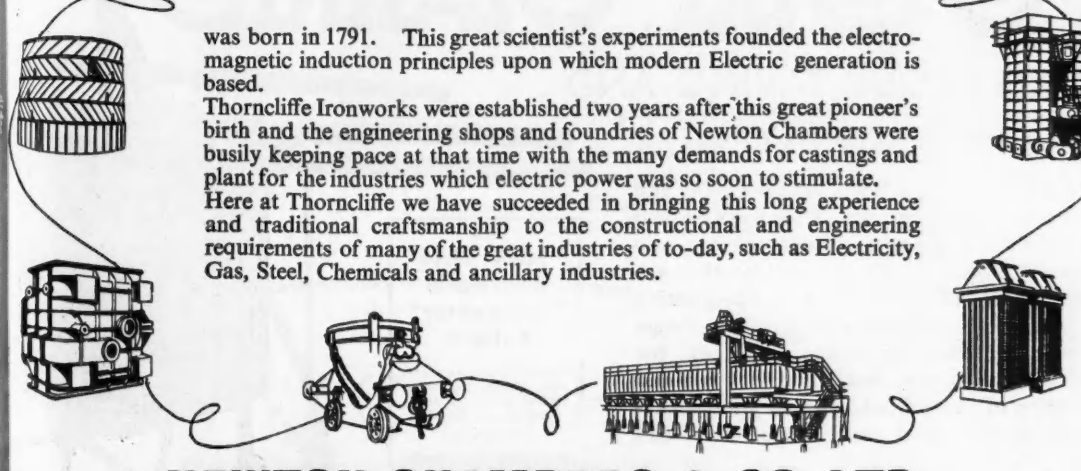

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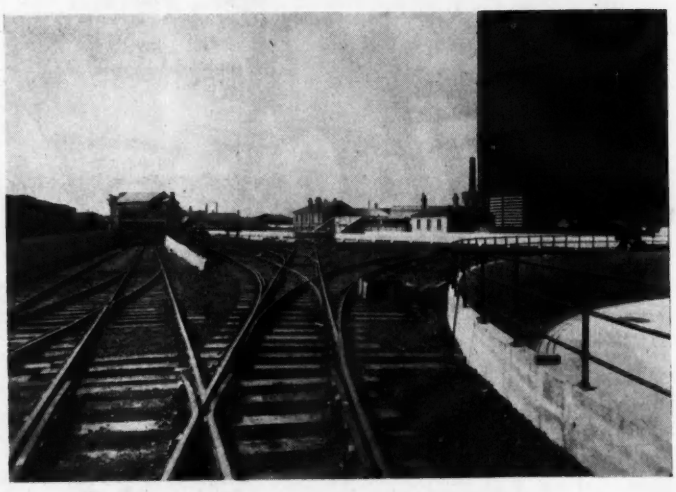

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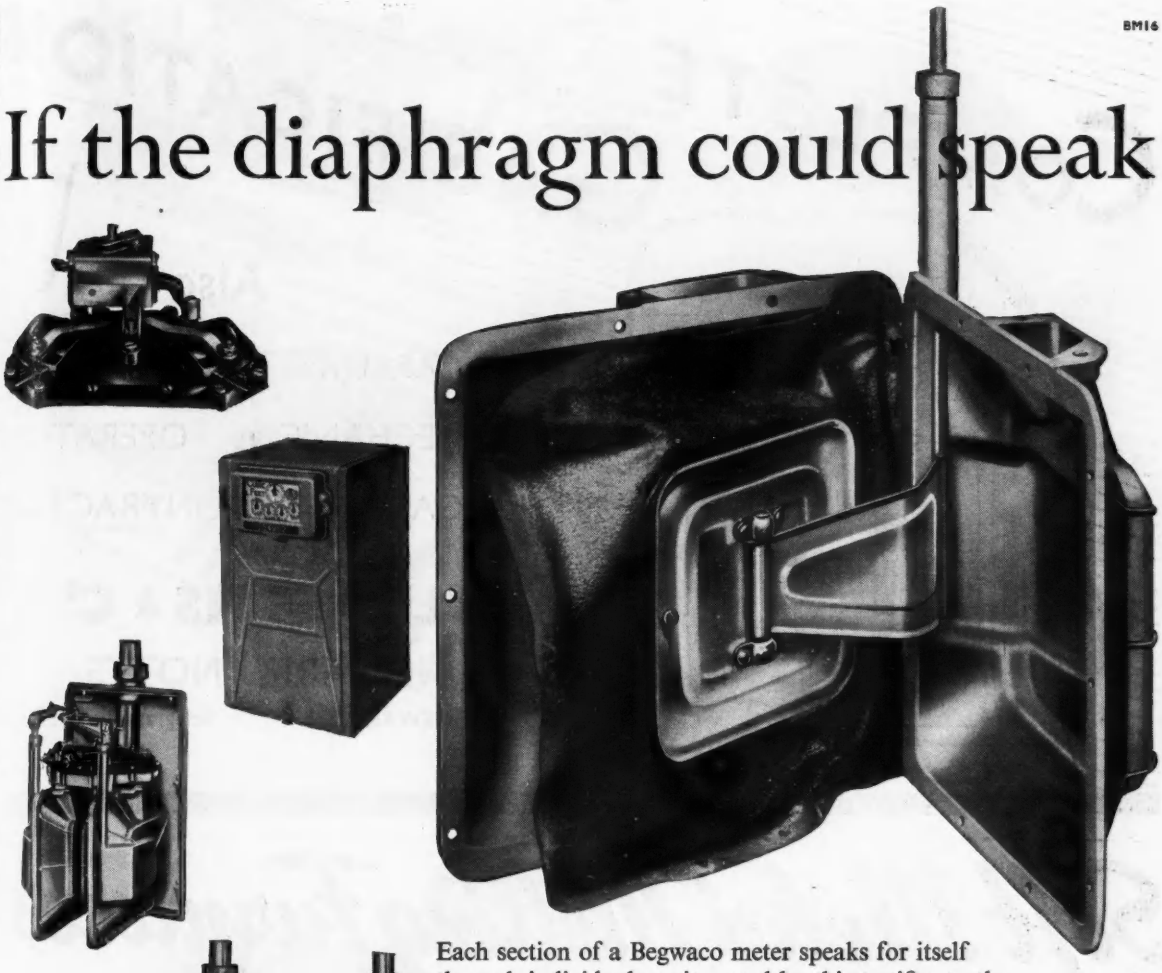

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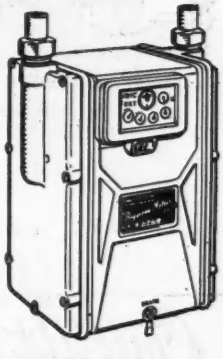

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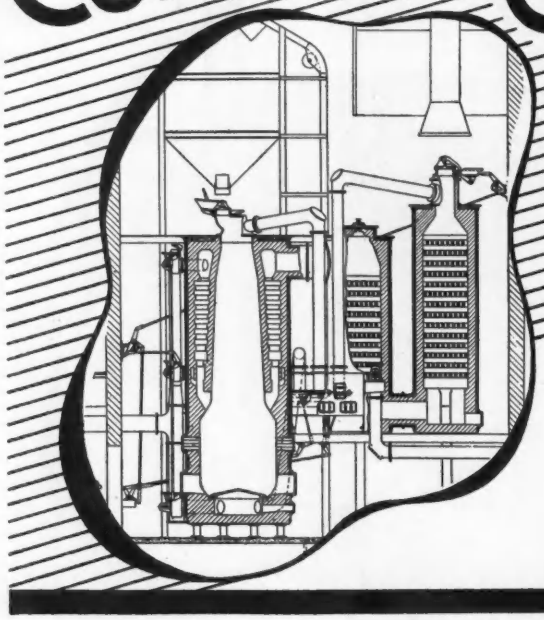

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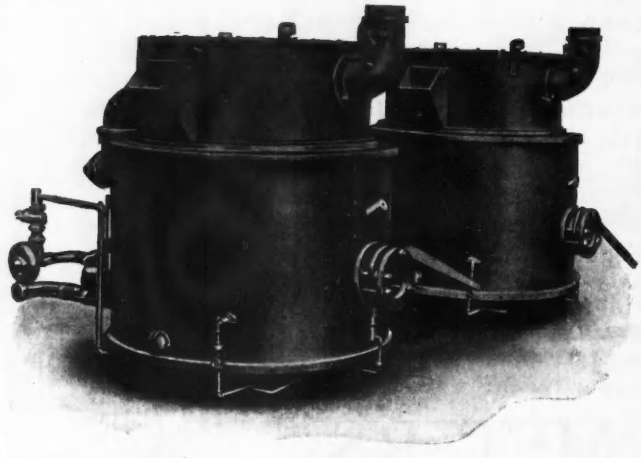

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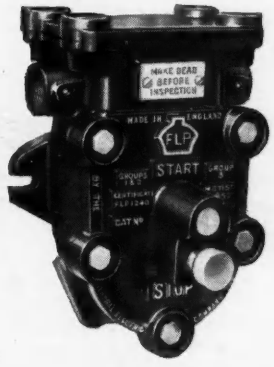
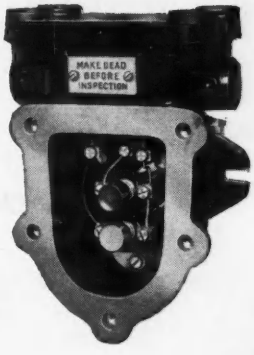
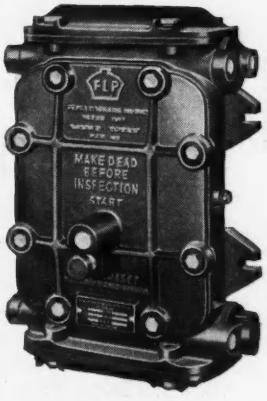




X 9129 *Flameproof Push-Button Stop and Start Switch.*



X 10584/5 *Flameproof Contactor Starter.*

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The examples here illustrated are certified for use in Groups I, II and III.

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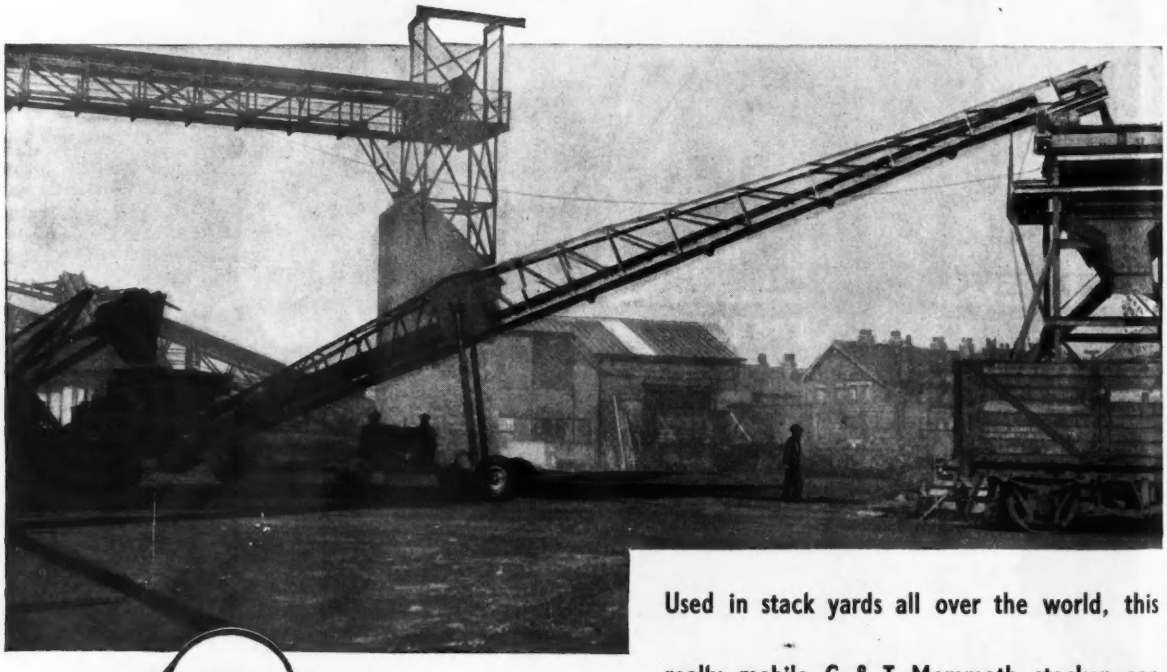

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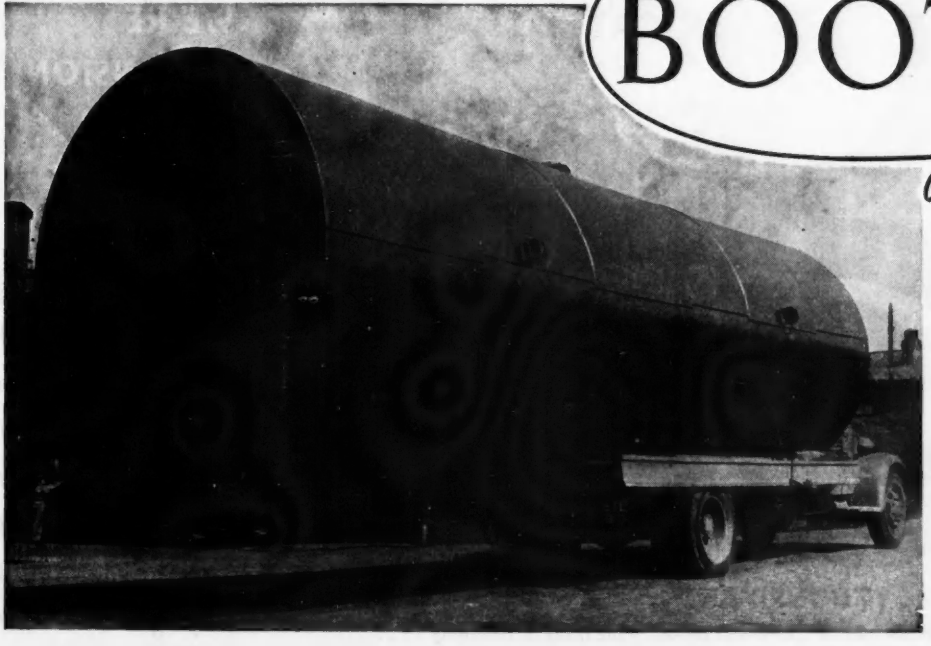

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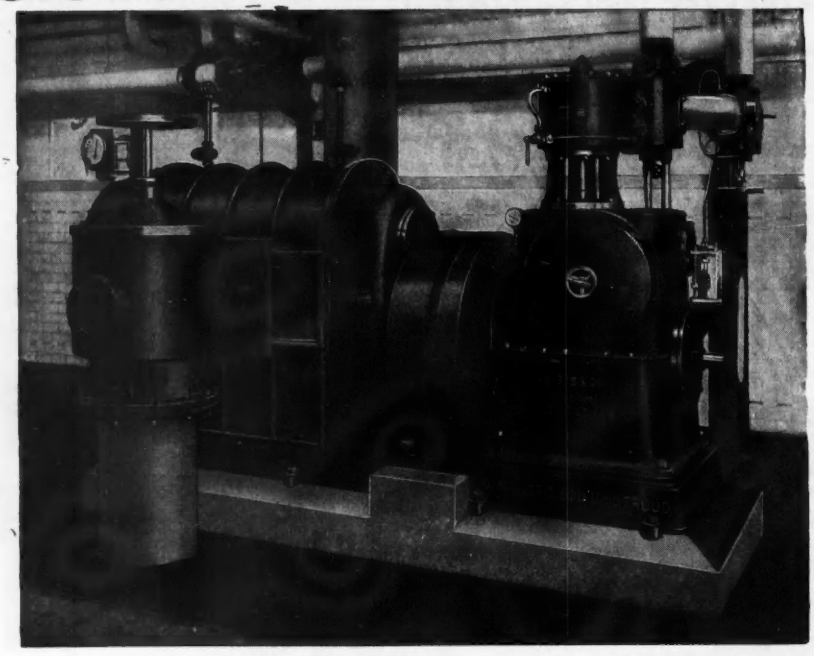

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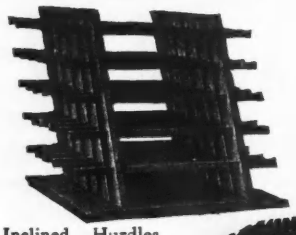

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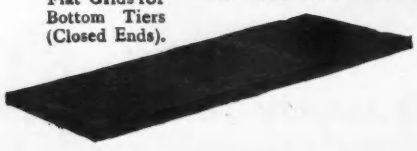

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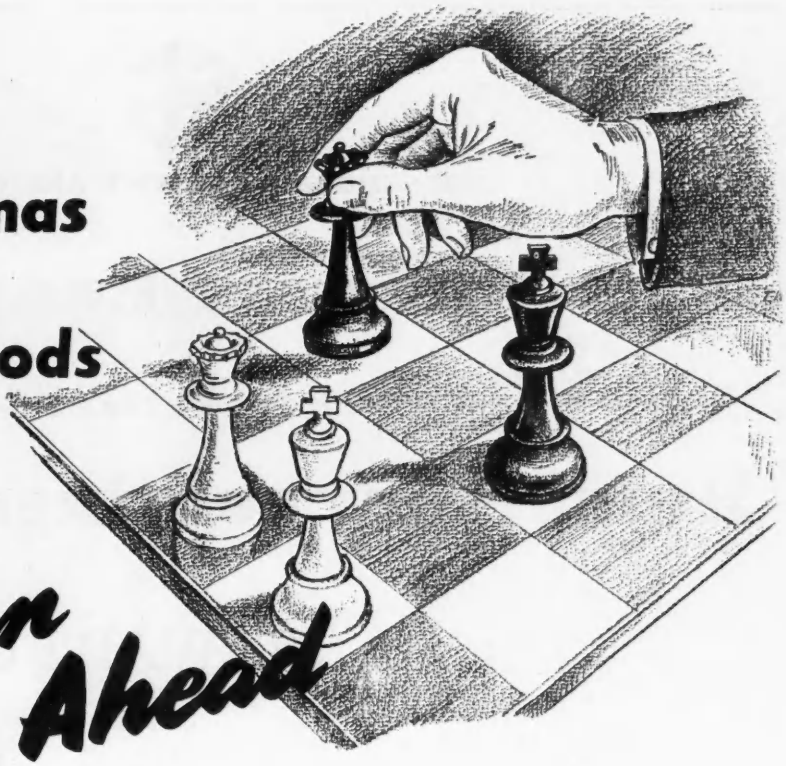

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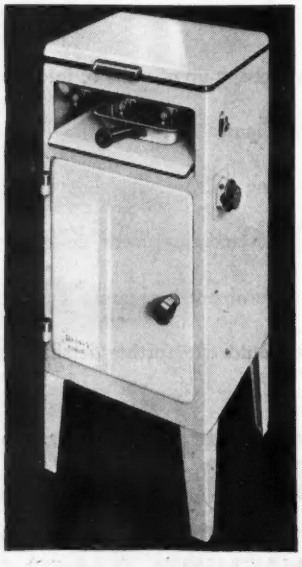

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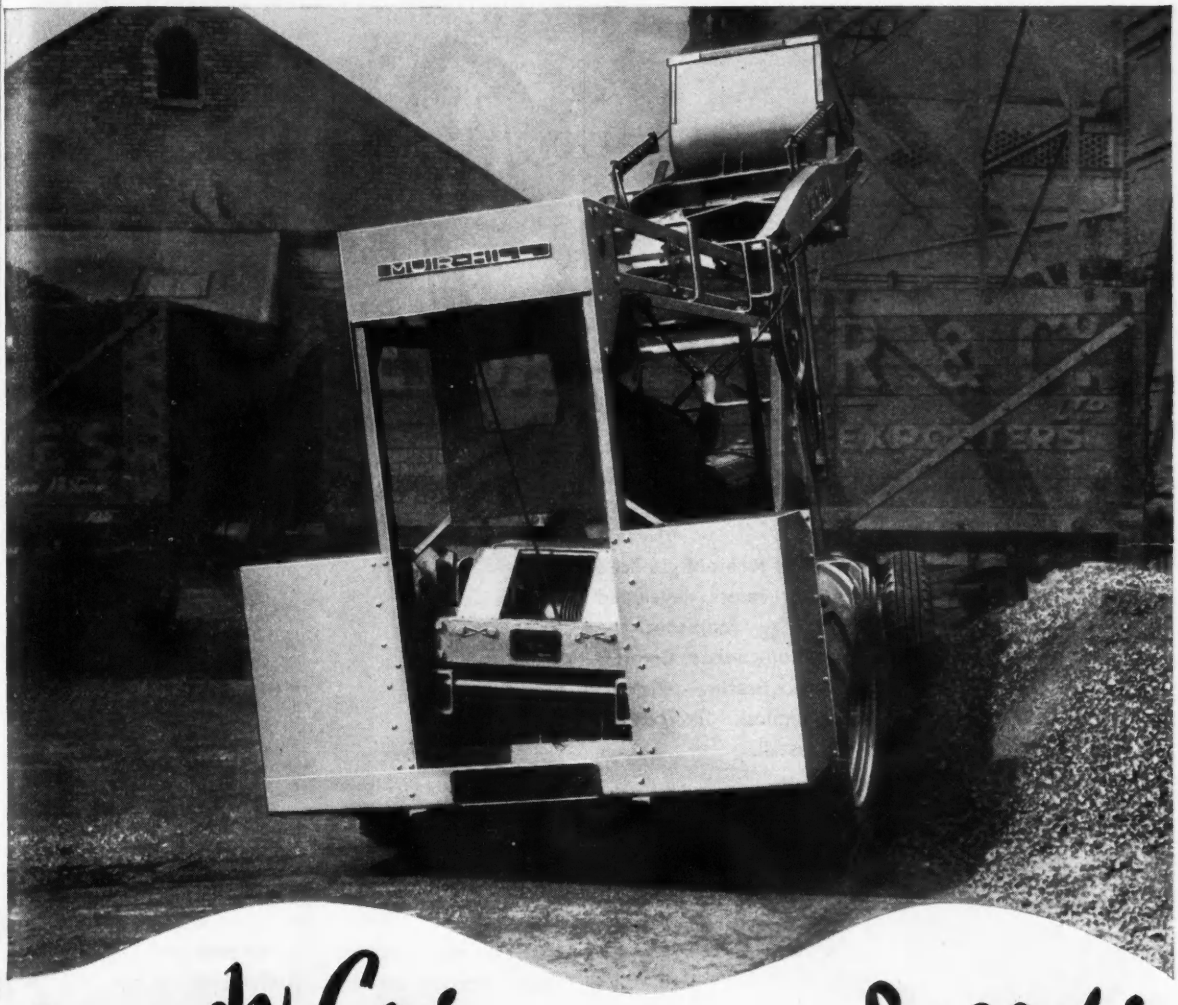

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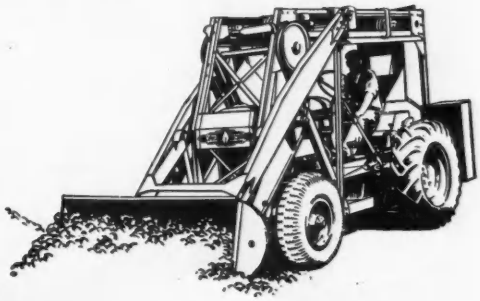

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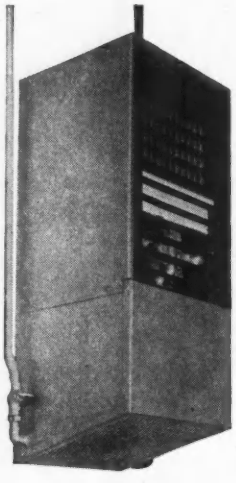

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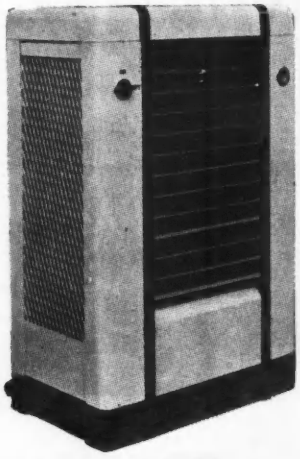

Centre. The Halcyon "L" type *industrial* space heater for flued or flueless operation. No floor space. Even distribution of heat. Quick temperature rise. Cheaper and easier to install than central heating.

Bottom. The Halcyon *Domestic* Space Heater, two models, both available for flued or flueless operation. Warms the whole house at low cost.

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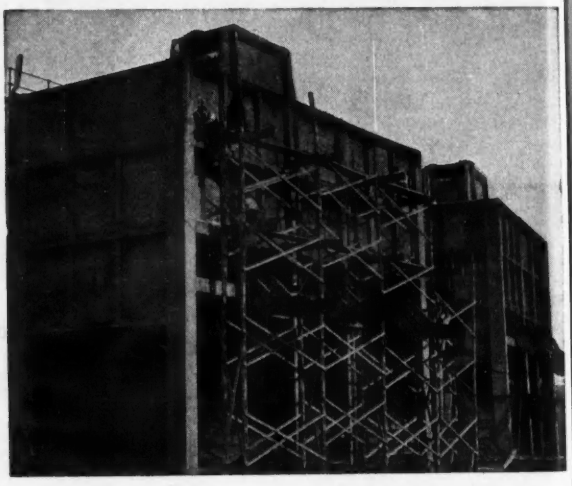

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For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

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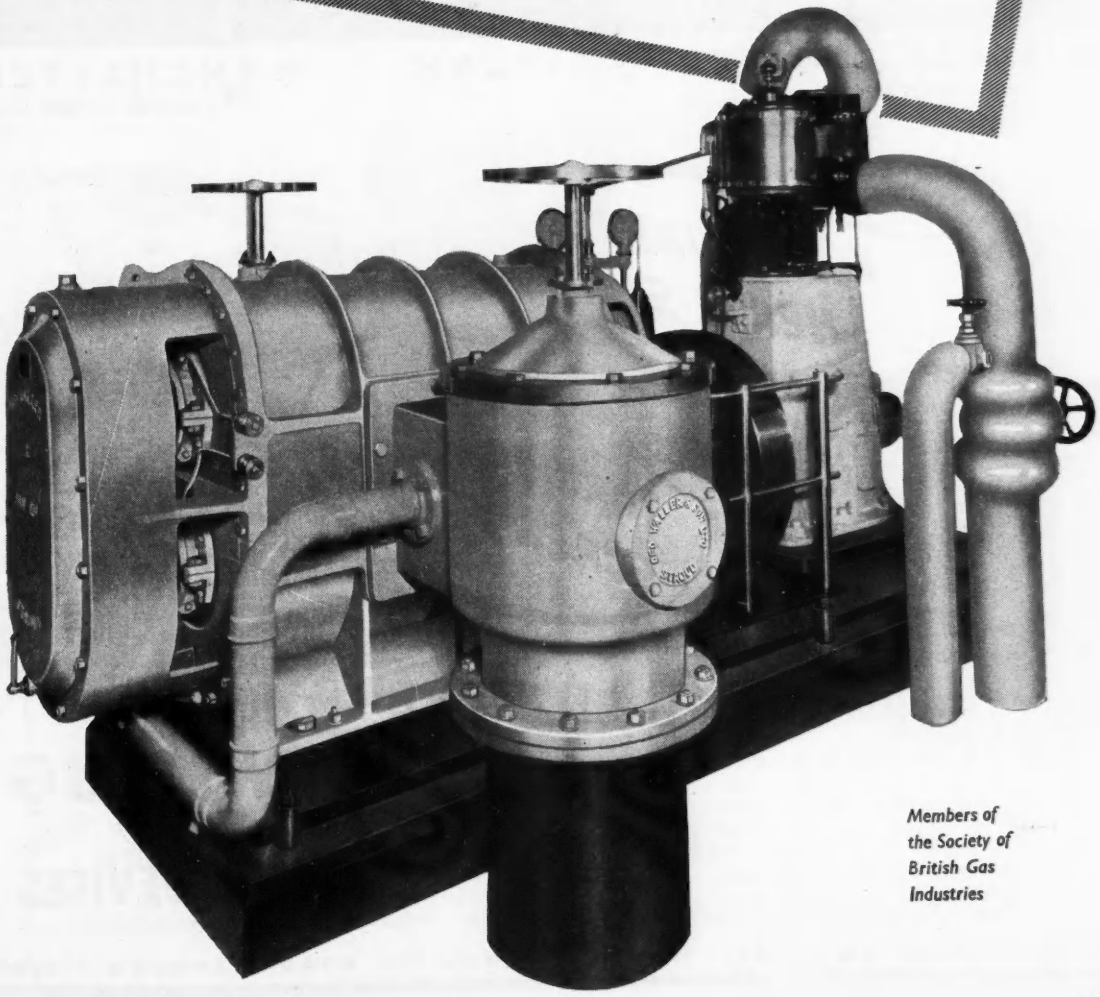

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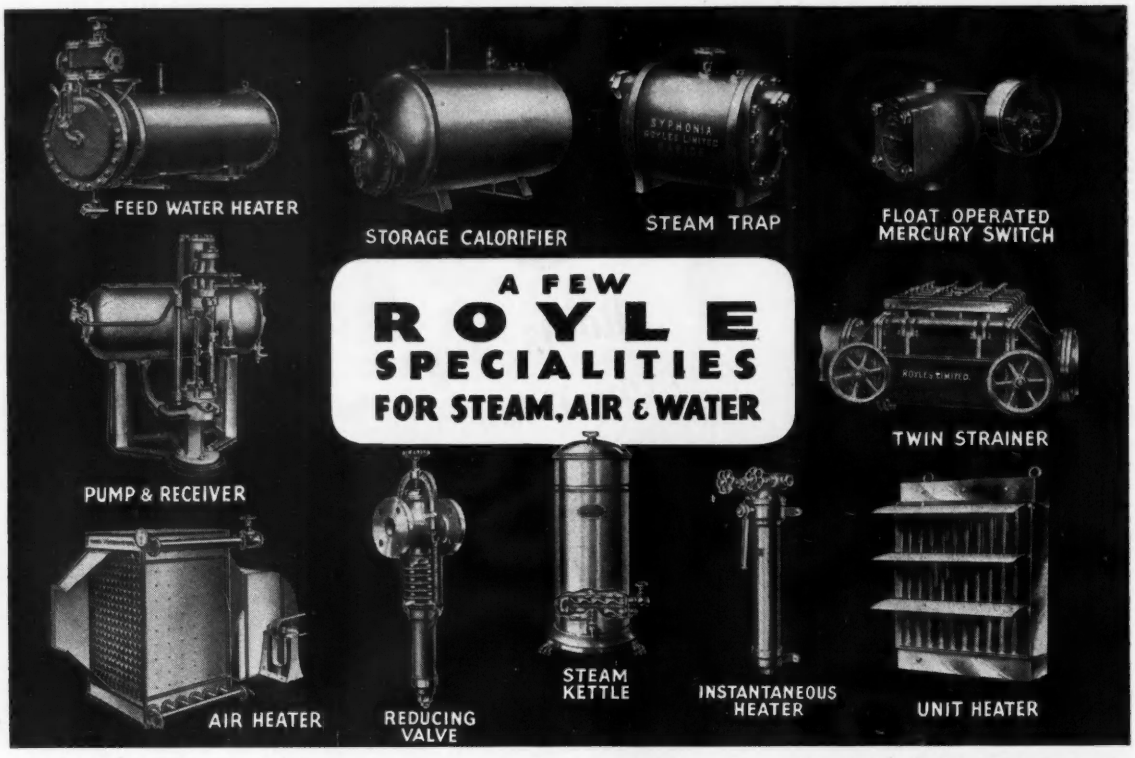

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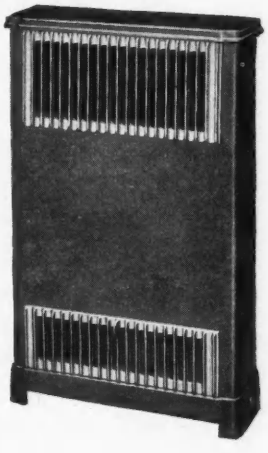

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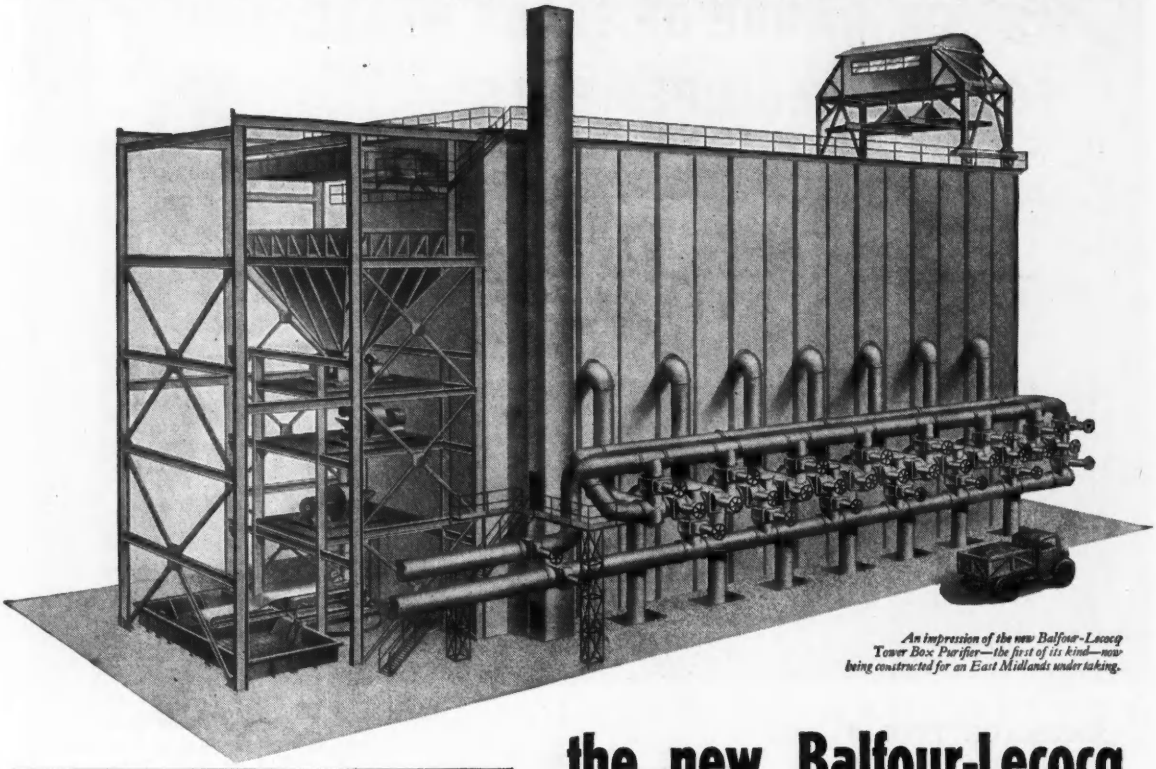
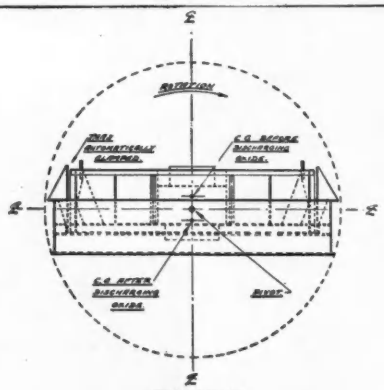


An impression of the new Balfour-Lecocq Tower Box Purifier—the first of its kind—now being constructed for an East Midlands undertaking.



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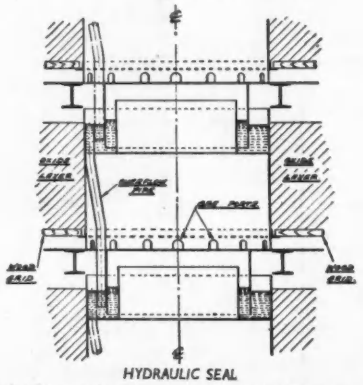

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This latest design of Tower Purifier incorporates all the known advantages of the process and also many new features which have been recently developed. Particular points of interest are reduction in ground space, complete mechanisation, fool-proof jointing between trays, separate drainage for each tray, minimum surfaces for painting, etc., unidirectional flow of gas, and ease of change-over of towers which can be carried out within a few minutes.

The technical resources of the Balfour organisation are at the service of those requiring detailed information on the application of Tower Purifiers to their own needs.

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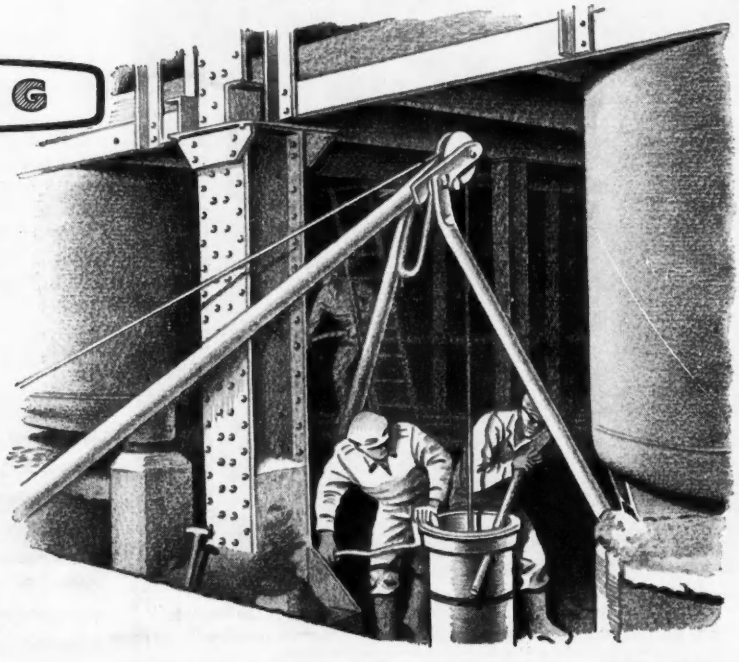

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Horizontal tube condensers in which the gas flows at right angles to the tubes, have been largely superseded by vertical tube multipass condensers, in which the gas flows parallel to the tubes. Although horizontal tube condensers have a higher heat transfer coefficient they have the disadvantage that internal cleaning of the tubes necessitates breaking and rejointing of water pass covers, and that the tubes are liable to corrosion due to air released from the cooling water being trapped in pockets.

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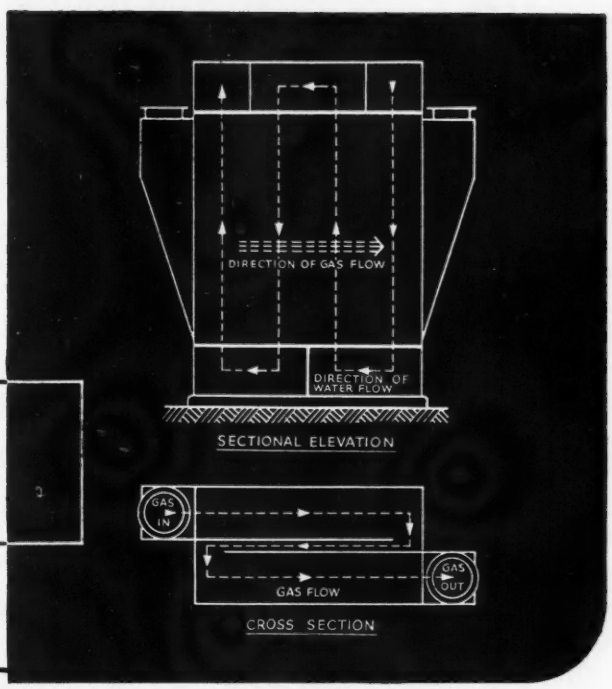
Whessoe *vertical tube horizontal gas flow* condensers combine the main advantages of both types. The gas flows at right angles to the tubes (as in horizontal tube condensers), thus securing a higher heat transfer coefficient, but the tubes are vertical, thus retaining the economical construction and ease of tube cleaning of vertical tube condensers.



Diagrammatic arrangement of a Whessoe vertical tube horizontal gas flow condenser.

Technical publications are available on request, including " Whessoe Condensing and Cooling Plant " just published.

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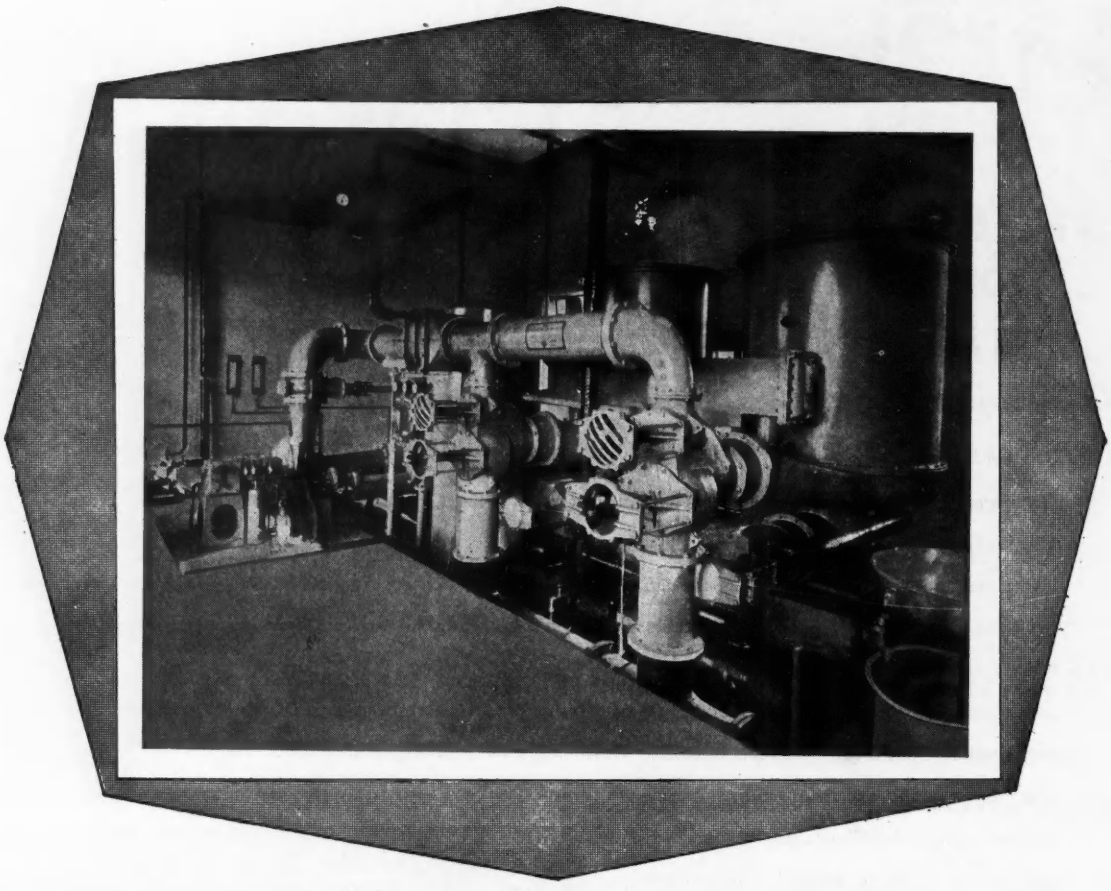

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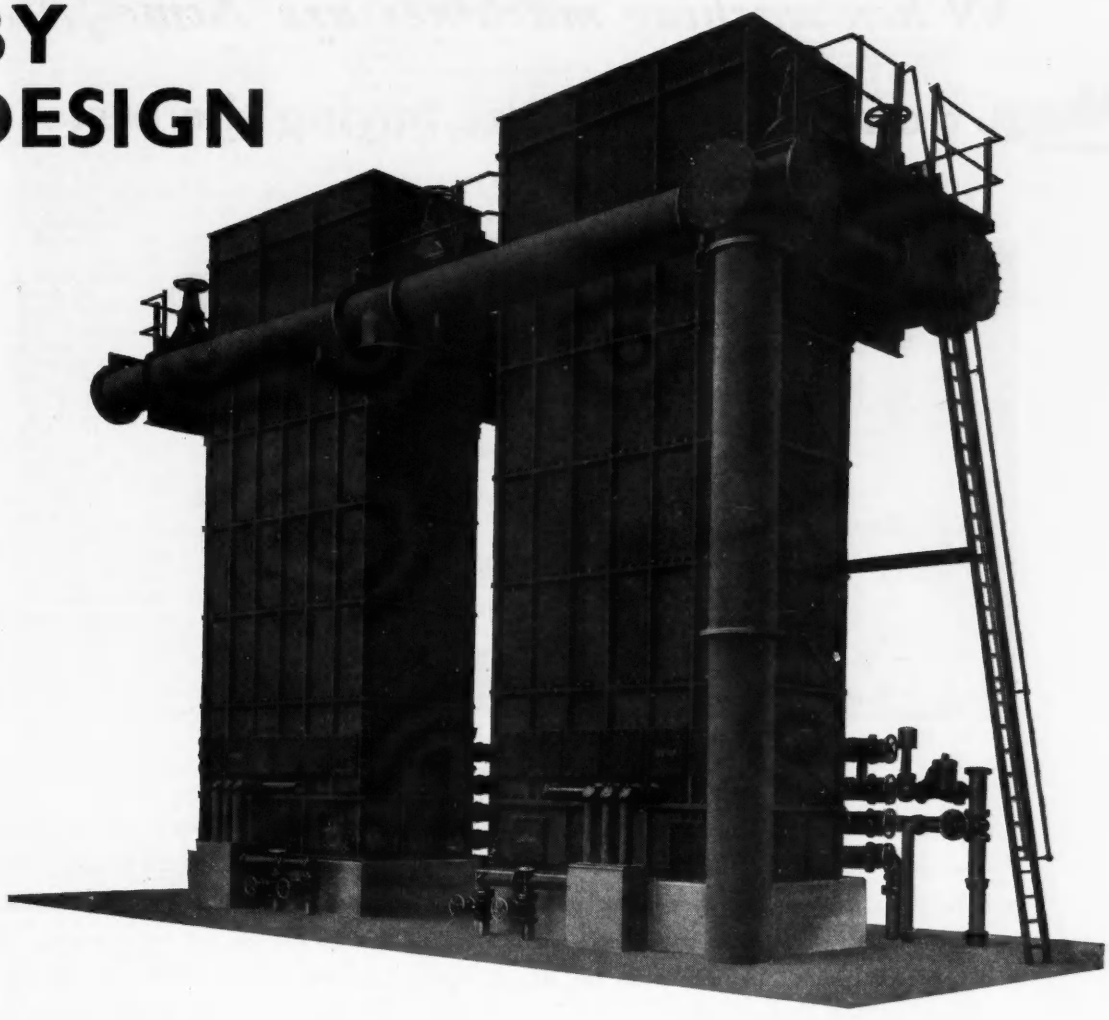

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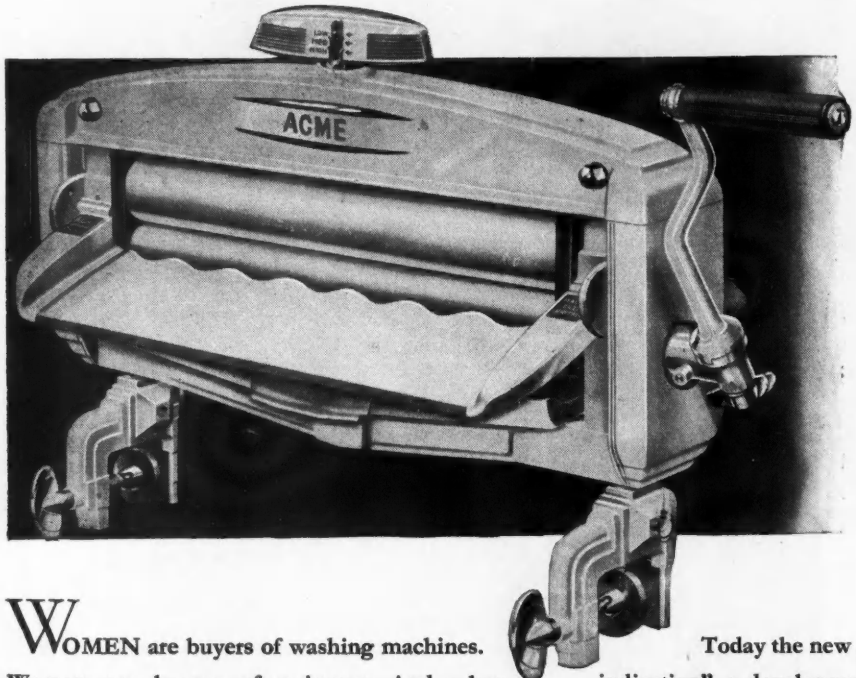

WOMEN are buyers of washing machines. Women are buyers of wringers. And when women think of wringers they think of the Acme. So when your machines are Acme-fitted your customers know that they must be, like the Acme, the best on the market.

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INDEX TO 'JOURNAL' ADVERTISERS

PAGE

A

A.C.E. Machinery, Ltd. ... ...
Abbott, Birks & Co., Ltd. ... ...
Accurate Recording Instrument Co. ... ...
Acme Wringers, Ltd. 590
Aerogen Co., Ltd. ... ...
Alder & Mackay, Ltd. ... ...
Allan Taylor (Engineers) Ltd. ... ...
Armco, Ltd. ... ...
Armco, Ltd., (Bundy Tubing Division) ... ...
Ascot Gas Water Heaters, Ltd. ... ...
Ascot Gas Water Heaters, Ltd. (F.A. Neat) ...
Ashmore, Benson, Pease & Co ... ...
Aspinall's (Paints), Ltd. S4
Associated Lead Manufacturers, Ltd. ... ...
Associated Lead Manufacturers, Ltd. (Rustodian) ...
Automatic Telephone & Electric Co., Ltd. ...
Automotive Products, Ltd.... ... ...
Averill, C. R., Ltd. ... ...

B

Bailey, Sir W. H., & Co., Ltd. ... ...
Bale & Church, Ltd. S3
Balfour, Henry, & Co., Ltd. 584
Begwaco Meters, Ltd 567
Bell's Asbestos & Engineering, Ltd. ... ...
Benham & Sons, Ltd. ... ...
Blakeley, Firth, Sons & Co., Ltd.... ... ...
Booth, John & Sons (Bolton), Ltd. 573
Boydell, E., & Co., Ltd. 579
Bray, George, & Co., Ltd. ... ...
Bray, W. E., & Co., Ltd. 564
Bridges, S. N. & Co., Ltd. ... ...
Bright, Son & Co. (Clerkenwell), Ltd. S3
Bristol's Instrument Co., Ltd. ... ...
British Flint & Cerium Manufacturers, Ltd. ... S1
British, Foreign & Colonial Automatic Light Controlling Co., Ltd. ... ...
British Furnaces, Ltd. 568
British Gas Purifying Materials Co. ... ...
British Industries Fair ... ...
British Iron & Steel Federation ... ...
British Oxygen Co., Ltd. ... ...
British Paints, Ltd. ... ...
British Thermostat Co., Ltd. ... ...
British Thomson Houston, Ltd. ... ...
British Tyre and Rubber Co., Ltd. ... ...
British Vacuum Cleaner & Engineering Co., Ltd. ...
Broadbent, Thomas, & Sons, Ltd. ... ...
Brockhouse Heater Co., Ltd. ... ...
Broom & Wade, Ltd. ... ...
Brotherhood, Peter, Ltd. ... ...
Brown, J., & Co., Ltd. ... ...
Bugden, Thos., & Co. S2

C

Cambridge Instrument Co., Ltd. ... ...
Cannon Iron Foundries, Ltd. ... ...
Carron Co. ... ...
Cementation Co., Ltd. 586
Central Manufacturing & Trading Co. (Dudley) Ltd. S2
Chemical Engineering & Wilton's Patent Furnace Co., Ltd. ... ...
Chemical & Insulating Co., Ltd. ... ...
Cinema-Television, Ltd. ... ...
Clapham Bros., Ltd. 589
Clayton, Son & Co., Ltd. ... ...
Clifford Engineering Co., Ltd. ... ...
Cochran & Co., Annan, Ltd. ... ...
Cohen, George, Sons & Co., Ltd. 575
Collins, Thomas, & Co., Ltd. ... ...
Concrete Proofing Co., Ltd. 580
Consolidated Pneumatic Tool Co., Ltd. ... ...
Coventry Chromium Plating Co. Ltd. ... ...
Cowper Penfold & Co., Ltd. 583
Cox & Danks, Ltd.... ... ...
Crane, Ltd. S2
Crone & Taylor, Ltd. 572
Crosby & Co., Ltd. ... ...
Crosslands (Rugeley) Ltd. S1
Crossley Bros. 576
Curtis, A. L. & Co. ... ...
Cutler, Samuel, & Sons, Ltd. 624

D

Davey, Paxman & Co., Ltd. ... ...
De la Rue, Thomas, & Co., Ltd. (Potterton Gas Division) 634
Demolition & Construction Co. Ltd. ... ...
Dempster, R. & J., Ltd. ... ...
Dempster, Robert, & Sons, Ltd. ... ...
Derbyshire Silica Firebrick Co., Ltd. 574
Diaphragm & General Leather Co., Ltd. ... ...
Dick, R. & J., Ltd. ... ...
Donkin (The Bryan) Co., Ltd. ... ... Cover II
Douglas, Robert M., (Contractors), Ltd. 566
Douglas, William, & Sons, Ltd. S6
Drakes, Ltd.... ... ...
Drew, H. B., Ltd. S2
Dunlop & Ranken, Ltd. ... ...

E

E.B. Refractory Cement Co., Ltd. ... ...
Edgar, William, & Son, Ltd. ... ...
Electroflo Meters Co., Ltd. ... ...
Electrolux, Ltd. ... ...
Elliott Bros. (London), Ltd. ... ...
English Electric Co., Ltd. ... ...
Ether, Ltd. ... ...
Evershed & Vignoles, Ltd.... ... ...
Ewart Chainbelt Co., Ltd. S2
Ewart & Sons, Ltd.... ... ...
Expanded Metal Co., Ltd.... ... ...

PAGE

F

Falk Stadelmann & Co., Ltd. ... ...
Fibreglass, Ltd. ... ...
Filtrators, Ltd. ... ...
Flavel, S., & Co., Ltd. ... ...
Fluxite, Ltd. S4
Four Oaks Spraying Machine Co., Ltd. 566
Fowler, John & Co., (Leeds) Ltd.... ... ...
Franki Compressed Pile Co., Ltd. ... ...
Fraser & Chalmers, Engineering Works ... ...
Fry's Metal Foundries, Ltd. ... ...
Fyffe & Co., Ltd. ... ...

G

Gas Chambers & Coke Ovens, Ltd. ... ...
Gas Purification & Chemical, Ltd. S3
General Descaling Co., Ltd. ... ...
General Electric Co. Ltd., ... 571
General Gas Appliances, Ltd. 585
Gibbons Bros., Ltd. ... ...
Gibbons (Dudley), Ltd. ... ...
Glover, George, & Co., Ltd. 563
Glover, Thomas, & Co., Ltd. 594
Goodall Clayton & Co., Ltd. ... ...
Goodyear Mechanical Goods ... ...
Grant, David, & Co., Ltd.... ... ...
Graphite Products, Ltd. S2
Green & Boulding, Ltd. ... ...

H

Hamilton, A. H., & Co., Ltd. ... ...
Hardman & Holden, Ltd. ... ...
Harris & Pearson, Ltd. ... ...
Harrisons (London), Ltd. ... ...
Harvey, G. A., & Co. (London), Ltd. ... ...
Head Wrightson Processes, Ltd. ... ...
Heaths (Eccles), Ltd. ... ...
Hayward Tyler, & Co., Ltd. ... ...
Hewitt Construction Co., Ltd. ... ...
Hickson's Timber Impregnation Co. (G.B.), Ltd. ...
Hilmor, Ltd... ... ...
Holden & Brooke, Ltd. ... ...
Holmes, W. C., & Co., Ltd. ... ... Cover I, S5
Honeywell-Brown, Ltd. ... ...
Hopkinsons, Ltd. ... ...
Horseley Bridge & Thomas Piggott, Ltd. ... ...
Horstmann Gear Co., Ltd.... ... ...
Howden, James, & Co., Ltd. ... ...
Hughes, F. A. & Co., Ltd. ... ...
Humphreys & Glasgow, Ltd. 592

I

Ideal Boilers & Radiators, Ltd. ... ...
I.C.I. Ltd. (Metals Division) ... ...
Incandescent Heat Co., Ltd. ... ...
Ingham, John, & Sons, Ltd. ... ...
International Coin Counting Machine Co., Ltd. ...
International Combustion, Ltd. ... ...

J

Jeavons, E. E., & Co., Ltd. ... ...
Jeavons Engineering Co. 570
Jenkins, W. J.. & Co.. Ltd. ... ...
Johnson, C. H. (Machinery) Ltd. ... ...

K

Keay, E. C. & J., Ltd ... ...
Keith Blackman, Ltd. S6
Kerr, John & Co. (M/C) Ltd. ... ...
King, Walter, Ltd. 624, 627, 628, S3
Kings Patent Agency, Ltd.... ... ... S4
Kirk & Co. (Tubes), Ltd. 574
Kirkham Hulett & Chandler, Ltd. ... ...
Kleenoff Co.... ... ...
Klinger, Richard, Ltd. ... ...

L

Laidlaw, R., & Son (Edin.), Ltd. ... ...
Lamont, James H., & Co., Ltd. ... ...
Lancashire Dynamo & Crypto, Ltd. ... ...
Lawler, Ayers & Co., Ltd.... ... ...
Le Bas Tube Co., Ltd. ... ...
Leeds X.L. Fire Cement Co. ... ...
Lionweld, Ltd. ... ...
Lind, Peter, Ltd. ... ...

M

Macpherson, Donald, & Co., Ltd. ... ...
Magnetic Valve Co., Ltd. ... ...
Main, R. & A., Ltd. 622, 623
Mavor & Coulson, Ltd. ... ...
Meltham Silica Fire Brick Co., Ltd. 586
Messenger & Sons, Ltd. ... ...
Meters, Ltd.... ... ...
Metropolitan Leather Co., Ltd. ... ...
Milnes Meters, Ltd. ... ...
Mitchell, H., & Co.... ... ...
Monk, A., & Co., Ltd. 573
Morris Commercial Cars, Ltd. ... ...

N

National Benzole Co., Ltd. ... ...
National Enamels, Ltd. ... ...
Newton Chambers & Co., Ltd. 565
Nordac, Ltd. ... ...
Nu-Swift Ltd. S3

O

Orme, Evans & Co., Ltd. ... ...
Oxley Engineering Co., Ltd. ... ...

P

Parkinson & Cowan (Gas Meters), Ltd. 594
Parkinson Stove Co., Ltd. 621
Pass, E. & Co., Ltd. ... ...

PAGE

Peckett & Sons, Ltd ... ...
Peebles & Co., Ltd.... ... ...
Pegson, Ltd. ... ...
Perl Controls, Ltd. 593
Pinchin, W. & Co., Ltd. ... ...
Power Gas Corporation, Ltd. ... ...
Powers-Samas Accounting Machines (Sales), Ltd. 577
Press, William, & Son, Ltd. ... ...
Pulsometer Engineering Co., Ltd.... ... ...

R

Radiant Heating, Ltd. ... ...
Radiation, Ltd. 612, 613
Rawlplug Co., Ltd. 582
Reavell & Co., Ltd.... ... ... S2
Riley, A. J., & Son, Ltd. ... ...
Roberts, R. E. & Sons, Ltd. ... ...
Royles, Ltd. 582
Rozalex, Ltd. ... ...
Russell, R., & Sons, Ltd. 578

S

Salter, T. E., Ltd. ... ...
Saunders Valve Co. Ltd. ... ...
Scottish Non-Ferrous Tube Industries, Ltd. ... ...
Shannon Ltd. ... ...
Shimwell & Co., Ltd. ... ...
Siebe Gorman & Co., Ltd. ... ...
Sigma Instrument Co., Ltd. ... ...
Simon-Carves, Ltd.... ... ...
Simon, Richard, & Sons, Ltd. ... ...
Sisson, W., & Co., Ltd. 576
Slingsby, W., & Co., Ltd. ... ...
Smith Meters, Ltd. ... ...
Smith, Thos. & Sons, (Rodley), Ltd. ... ...
Spencer Bonecourt, Ltd. 563
Sperryn & Co. Ltd.... ... ...
Standard Furnace & Setting Co., Ltd. ... ...
Stanton Ironwork Co., Ltd. ... ...
Staveley Iron & Chemical Co., Ltd. 569
Stein, John G., & Co., Ltd. ... ...
Stelcon (Industrial Floors) Ltd. ... ...
Stewart & Gray, Ltd. 578
Stewarts & Lloyds, Ltd. ... ...
Stone, J. B., & Co., Ltd. ... ...
Stoves, Ltd. ... ...
Strachan & Henshaw, Ltd. ... ...
Stringer Bros. S4
Sugg, William, & Co., Ltd. 580
Summerson, Thos. & Sons, Ltd. ... ...
Sutcliffe Speakman & Co., Ltd. 588
Sutherland, A. G., Ltd. ... ...

T

Tarslag, Ltd. ... ...
Taylor, F., & Sons, Ltd. ... ...
Thermo Control Installations, Ltd. ... ...
Thomas & Bishop, Ltd. 636
Thomas (Richard) & Baldwins, Ltd. ... ...
Thompson, John, Conveyor Co. ... ...
Thorp, Thomas, & Co., Ltd. ... ...
Tully, Sons & Co., Ltd. 568
Turners Asbestos Cement Co., Ltd. ... ...

U

Underpressure Engineering Co., Ltd. ... ...
United Kingdom Construction & Engineering Co., Ltd. ... ... Cover II

V

Vale, Thomas, & Sons, Ltd. 578
Vanda Meters, Ltd.... ... ...
Visco Engineering Co., Ltd. ... ...
Vulcan Stove Co., Ltd. ... ...

W

W.D. (Sheeters), Ltd. ... ...
Wakefield, C. C., & Co., Ltd. 614
Wakelin, F. H., Ltd. S4
Walker, C. & W., Ltd. 570
Walker, Crosweller & Co., Ltd. ... ...
Waller, George, & Son, Ltd. 581
Ward, Thos. W., Ltd. 633
Wellington Tube Works, Ltd. ... ...
Wellman Smith Owen Engineering Corpn., Ltd. ... ...
Wessex Industries (Poole) Ltd. S1
West's Gas Improvement Co., Ltd. ... Cover III
West Hunwick Silica & Firebrick Co., Ltd. ... ...
West's Piling & Construction Co., ... Cover IV
Westwood & Wrights, Ltd. S6
Whessoe, Ltd. 587
Whitehouse, Wm., & Co., Ltd. ... ...
Wilkes, A. H., & Co., Ltd. ... ...
Willey & Co., Ltd. 634
Williams, John E., Ltd. ... ...
Williamson Cliff, Ltd. ... ...
Wilson, George, Gas Meters, Ltd. ... ...
Winn & Coales, Ltd. ... ...
Woodall-Duckham Vertical Retort & Oven Construction Co. (1920), Ltd. 611
Wood, Hugh, & Co., Ltd. ... ...
Wright, Alexander, & Co., Ltd. ... ...

Y

Yorkshire Copper Works, Ltd. ... ...

Appointments Vacant S3,S4
Appointments Wanted ... ...
Contracts Open ... ...
Educational ... ...
Financial ... ...
Miscellaneous S4
Notice ... ...
Patents S4
Plant For Sale S4
Publications S4
Repairs S3

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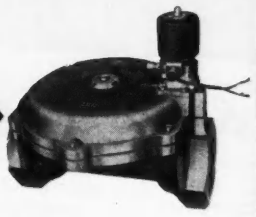

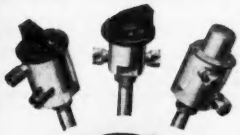

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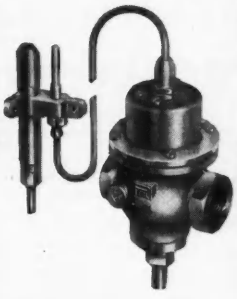

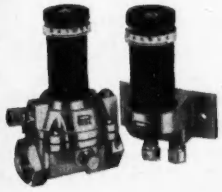

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103rd YEAR OF PUBLICATION

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VOL. 268 NO. 4618 DECEMBER 5, 1951

CONTENTS

Page

EDITORIAL COMMENT
Gas Council Research ... 595

INSTITUTION OF GAS ENGINEERS
Review of Autumn Research Meeting ... 596
Cartoon by 'Mel' ... 599
Gas Council Organisation for Research: Statement by Colonel H. C. Smith ... 605
Research Luncheon: Sir Robert Robinson on the Need for Elasticity ... 606

NEWS OF CURRENT EVENTS
Personal ... 603
Obituary ... 603
Diary ... 604
New British Standard ... 604
Smith Meters Dinner and Dance ... 604
Gas Staffs and Fares ... 607
Home Service Advisers at Birmingham ... 607
Liverpool Bakers Protest ... 607
Gas Council Lectures ... 607
News in Brief ... 608
Power-Gas Canada, Ltd. ... 608
Saving Fuel: Importance of Insulation ... 608
Guernsey Cooking Demonstrations ... 609
Mains to Make Refrigerators ... 609
Shipley Compensation ... 609
Publications Received ... 610
North Thames Pensioners' Party ... 615
Women's Gas Federation: Seventh Branch Conference 616
Liverpool in First Aid Finals ... 616
Therm Conversion Device ... 617
Domestic Science Teachers Visit Gas Board ... 617
Penrith Developments ... 617
New Oil Distillation Unit ... 617
Rebate for Belfast Consumers ... 619

CONSULTATIVE COUNCILS
North Thames Price Increase ... 615

IN PARLIAMENT
Scarcroft: Government Enquiry ... 610

FEATURE ARTICLE
Gas Industry in France. By Ashton ... 618

COMPANY MEETINGS
Malta and Mediterranean Gas Company ... 635
Oxley Engineering Co., Ltd. ... 636

TECHNICAL RECORD
Swansea's Distribution Scheme. By J. H. Nutton, M.S.M.A., M.Inst.F., Swansea and Carmarthen Group ... 620
Aspects of Gasworks Construction. By R. F. Robinson, M.Inst.Gas E., Divisional Constructional Engineer, Watford ... 626
Equipping of Large Kitchens. By Alec Hughes, Radiation (Large Cooking Equipment), Ltd. ... 630

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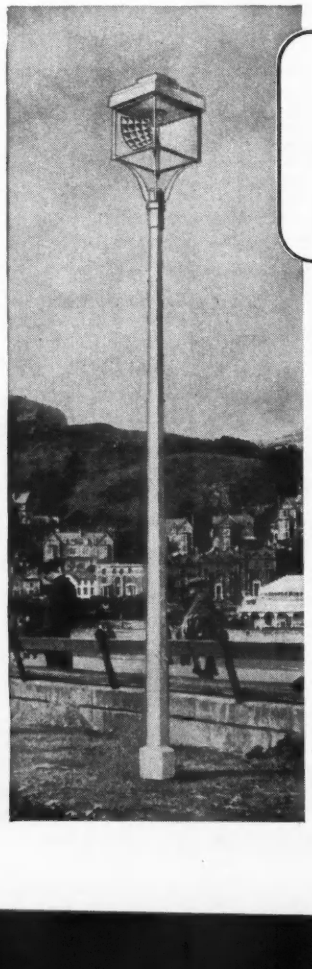

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GAS JOURNAL

VOL. 268. NO. 4618 103RD YEAR DECEMBER 5, 1951

GAS COUNCIL RESEARCH

THE Autumn Research Meeting of the Institution of Gas Engineers—the seventeenth and not the last of the series—opened in London on Tuesday of last week with the eagerly anticipated statement on the organisation of Gas Council research by the Deputy Chairman of the Council, Colonel H. C. Smith, Chairman of the Gas Research Board. The statement is published on p. 605 of our issue today. If 'eagerly anticipated' is apt, equally is 'long awaited,' for the wheels of the Gas Council grind carefully and ponderously and no chinks are permitted in the closed doors of Gas Industry House. Research meetings of the Institution are solemn affairs not to be taken lightly, but we think that there is danger of the solemnity being overdone, for if any industry is to survive and progress research is a commonplace ingredient in its policy and research conversations are to be regarded as being quite ordinary. As time goes on more and more people will be engaged in the pursuit of research and we cannot believe that because of this we shall see industry in general blessed as never before with wit and wisdom.

Now that the mantle of mystery has been almost wholly lifted from the research plan of the Gas Council we see that the structure is very simple and unexciting. The Gas Act empowers the Council to conduct research, and the Council has taken gas industry fundamental research ('matters affecting gas supply and carbonisation') into its hands. A Research Committee has been formed and two research stations have been established. The view was soon taken by the Council that the Gas Research Board was not an appropriate body to satisfy the duties imposed on the Council by the Gas Act, and already we see the G.R.B., with all its promise, disintegrated. The G.R.B. complete gasification programme, with plant and staff, has been transferred to Birmingham with Dr. F. J. Dent as Director. That has been a move *en bloc* and, we suppose, without many tears, in spite of the amenities of Bournemouth. The G.R.B. at Beckenham remains in semi-twilight to turn into loaves for the time being the crumbs offered by the Gas Council Research Committee. It will be seen from Colonel Smith's statement that shortly the Council of the Gas Research Board is to put certain proposals to its members. This does not carry us very far. We can only echo the hope that the proposals, whatever they may be in this 'after you, Claude,' performance, will 'prove acceptable' to members.

So, up to a point, 'If you want the best research, we have it,' may be applied to the Gas Council. From Colonel Smith's statement it is made clear that the Gas Council is sensitive to the fact that it will not be able to supply the research goods without effective liaison work. It is good to know that the long-standing connection with the University of Leeds will be maintained and that a Joint Committee of the Gas Council is to be constituted (*i.e.*, the Joint Research Committee is to be reconstituted as such). It is good to know that the platform of the Institution of Gas Engineers is to be used as a suitable means of disseminating the findings of G.C. research. We note that the G.C. Research Committee is to establish a Research Liaison Committee consisting of the Livesey Professor, the directors of the Council's research stations, and an officer to be nominated by each area board to 'keep each area board closely in touch with the progress of research being carried out and to keep the directors of research informed of problems arising in the industry.' And we are glad that the Research Committee does not intend to publish research reports annually just for the fun of the thing.

One important element, however, needs to be discussed more openly and defined clearly without delay —the position of the S.B.G.I. in this brave new nationalised world of gas research. 'It is the intention of the Gas Council,' said Colonel Smith, 'to collaborate in the most practical way with the member firms of the Society of British Gas Industries who are doing research

The opening session of the Autumn Research Meeting at the Institution of Mechanical Engineers. Mr. J. H. Dyde welcomes guests from overseas.

of interest to the industry. Discussions are now taking place with the Society of British Gas Industries in order to arrive at the most effective method of collaboration.' We understand that a meeting on this matter is being held this week. Here is an opportunity for the Gas Council to tell the industry what emerges, instead of adopting the mystery rôle. The S.B.G.I. had, of course, representation on the Council of the Gas Research Board. It is of first importance that collaboration should be close between the Gas Council Research Committee, with its academic undertone, which we do not criticise, and the great and small constructional firms making the plant for the industry to use. The width and length of experience of a special and practical nature of many of these firms is not excelled by any of the research elements in the gas industry's composite organisation. That experience covers the conditions not only of this country but of others, and on the face of it it seems that at some point in the new organisation there should be direct contact and maybe representation, for there can be no doubt that the S.B.G.I. is qualified to bring before the G.C. Research Committee ' problems arising in the gas industry.' The industry depends on the plant constructor for the industrial application of the results of research. How best are the resources of these firms to be made available to the gas industry?

The Institution Research Meeting was held at the Institution of Mechanical Engineers under the Presidency of Mr. J. H. DYDE, Deputy Chairman of the Eastern Gas Board. From start to finish the large attendance was enthusiastic and unflagging.

The first duty which the President had, and a very pleasant one, was to welcome to the meeting guests from overseas. M. R. H. Touwaide, the General Secretary of the International Gas Union and Secretary of the Belgian Gas Association, was, said Mr. Dyde, no stranger to them. Then they had with them M. A. Renauldon, M. R. Prevot, and M. L. Taubert, of the Research Department of Gaz de France; and they were glad to welcome Mr. J. S. Thompson, Continental representative of W. C. Holmes and Co., Ltd., and Mr. F. J. Healey, Brazil.

The Secretary, Dr. W. T. K. Braunholtz, reported the receipt of a cable of good wishes from Dr. Harold Hartley, who is in Australia, and a message from Colonel H. Zollikofer, General Secretary of the Swiss Gas and Water Association.

Then came the statement by Colonel H. C. Smith, Deputy Chairman of the Gas Council and Chairman of the Gas Research Board, on the Gas Council's organisation for research. The statement, which was eagerly awaited, is published on p. 605 and has been the subject of comment in our preamble to this general note on the meeting's proceedings.

The Report of the Sub-Committee on Unaccounted-for Gas followed, this being introduced by the Chairman, Mr. H. T. Escreet. It is a review of the interim report published in 1938, revised and amplified where necessary. The recommended method of calculation of gas quantities set out in the earlier report has been enlarged by the addition of a note on the effect of continuous meter reading; otherwise there has been only minor revision of the original text. The section of the previous report dealing with factors influencing unaccounted-for gas has, however, been completely revised and expanded, with particular reference to the reduction to a minimum of leakage from mains and services by proper methods of installation and maintenance and to methods of dealing with escapes of gas from the distribution system. Details are given of the calculation of ' unread gas at the end of each quarter.' This quantity may be considerable, especially when meters are read in a continuous quarterly cycle. To arrive at the true unaccounted-for gas and the true gas revenue for the quarter the quantity must, of course, be estimated and valued. The report was not discussed at the meeting, but

the President remarked that a larger number of the smaller undertakings had not implemented the interim report, and results were showing an abnormal unaccounted-for gas in many districts. Mr. Escreet brought out the nature of the local consideration that should be given to the report, and it is to be discussed at meetings of the District Sections of the Institution. In point of fact it has already been before a meeting of the Northern Section.

Safety First

The 12th Report of the Chairman's Technical Committee, 1950-51, was introduced by the Chairman, Mr. F. M. Birks. As Mr. E. G. Stewart subsequently pointed out, an appreciable proportion of the work of the Safety Rules Committee has been devoted to the preparation of a new code dealing with the safe opening of gasworks plant. This is considered by the Committee to be of the highest importance, contributing, as it does, the basic code for all operations of gasworks plant. Information is included dealing with legal requirements, purging by carbon dioxide, safety lighting, and so on. In the general code itself, detailed consideration is given to the proper authorisation and planning of operations, to the effective isolation of plant under repair, to the handling of sludges, and to the avoidance of explosive mixtures by purging with inert gases. The new code envisages the use of inert gas purging as the only universal completely safe method.

Dempster Travelling Fellowship

Before the 28th Report of the Gas Education Committee, 1950-51, was presented, the President, who is also Chairman of the Committee, made an interesting announcement concerning the Dempster Travelling Fellowship. 'Some months ago,' said Mr. Dyde, 'Mr. Charles Dempster, Chairman of R. & J. Dempster, Ltd., approached him about giving a sum of money to the Institution in memory of the late Robert Dempster, senior and junior, and John Dempster. The matter was discussed with the Education Committee, and recommendations were made which were endorsed by the Council and readily agreed to by Mr. Charles Dempster. In the result a Dempster Travelling Fellowship was endowed. The Institution is to be the trustee of the endowment, the income from which is to be applied from time to time (not necessarily annually) as a travelling fellowship to enable the holder to study, either in this country or overseas, technical developments of interest to the gas industry. The Dempster Fellowship is to be awarded and administered by a small committee consisting of the president and the two vice-presidents for the time being, and the honorary secretary, of the Institution.' Mr. Dyde took the opportunity of expressing the Institution's thanks to Mr. Charles Dempster for the generous and lasting contribution to the educational facilities offered to the industry.

Education

Next item was to receive and discuss the Education Report. Of especial interest in this report is reproduction of the correspondence between the Institution and the Ministry of Education on the future development of higher technological education. In a letter to the Minister of Education dated April 11, 1951, the then President of the Institution, Mr. Birks, explained the views of the Council and the Education Committee, which considered that, instead of initiating an entirely new education authority or board, such as the proposed Royal College of Technologists, a more satisfactory approach to the problem would be the selection of four (or not more than six) technical colleges to be built up, equipped, and staffed

Throughout the sessions the meeting hall was packed.

to provide curricula equivalent to university standard. The training of technicians at a lower level should be divorced from these selected institutions. In a previous letter to the Secretary of the National Advisory Committee on Education for Industry and Commerce, Dr. Braunholtz had put forward the opinion of the Council and the Education Committee of the Institution that the increased expenditure involved under the Government plan for the establishment of a Royal Technical Institute might be better devoted to an extension of the system of awards now given by certain of the major technical colleges. During the discussion and report, Dr. J. N. Long, Principal of the Westminster Technical College, agreeing wholeheartedly with the Institution's views, said what a great pity it is that the Government should start an entirely new scheme needing equipment, buildings, sites, and office organisation—a scheme which would lead to confusion. The sensible view was that existing colleges should have their equipment brought up to date—and much of it was 25 years old.

Regarding the report of the examiners, Mr. W. S. Hubbard, of Liverpool, commented that, in answer to a question asking for a description of the repair of a vertical retort *in situ*, one student said that a lot of ironwork was taken away and a man in an asbestos suit carried out the repair quite satisfactorily. The student added that unfortunately the method was not perpetuated because the man died a few days afterwards. 'Oh yes,' said Mr. Hubbard, 'that is a perfectly true story.' If examples of the kind are cited in next year's report we should have quite an entertaining account. In Mr. Hubbard's opinion little improvement will take place until (i) considerably improved college and school facilities are available for the teaching of the main subjects; (ii) there is a higher standard of teaching in the main subjects; (iii) greater care is taken in the selection of junior personnel for entry into the gas industry. Better school and college facilities and better trainee selection could, he maintained, be quickly brought about if the area boards take early and practical advantage of the facilities provided by the Gas Act.

Presentation of Awards

Mr. Dyde presented Institution diplomas to the successful candidates in the 1951 examinations. Diplomas in Gas Engineering (Manufacture) were awarded to G. C. Cookson (Birmingham), H. G. Abraham (Birmingham), W. M. Johnston (Aberdeen), D. J. Maunder (Torquay), and W. D. Rees (Aberavon); in Gas Engineering (Supply) to A. D. Mason (Cardiff), C. G. Partington (Blackpool) and R. F. E. Saggers (Cheshunt).

Charles Hunt Memorial Medals for 1951 were awarded to G. C. Cookson and A. D. Mason; James Archibald Maclay Memorial Prizes to H. M. Gower (Gloucester) and K. Sullivan (Liverpool).

The proceedings of the opening session were brought to a close by the Fifth Arthur Duckham Fellowship Report, 'Aspects of the Mechanism of the Gasification of Carbon by Carbon Dioxide and Steam,' by J. D. F. Marsh. The report was not discussed. Having reviewed the significant published work on the mechanism of the reactions between carbon and carbon dioxide and steam, the author describes an apparatus by which the reactions of a carbon sample were studied. A flow system was used, and the reactants were passed consecutively over the carbon sample. It has been found that, when a carbon sample is reduced by hydrogen and then treated with carbon dioxide at a temperature below that necessary for gasification, a reaction takes place producing carbon monoxide and a surface layer of adsorbed oxygen. The volume of carbon dioxide reacting with unit weight of carbon depends on the temperature, the surface area of the carbon, and the nature of the surface, which is modified by ash constituents. This surface oxygen can be removed as water vapour by subsequent treatment with hydrogen. In a series of consecutive runs on high temperature coke, the average weight of water formed was equivalent to the average volume of carbon monoxide formed during the carbon dioxide treatments.

If a sample of high temperature coke be covered with a surface oxygen layer and then treated with carbon monoxide, most of the oxygen is removed as carbon dioxide. On the reduced surface, carbon monoxide is then converted to CO_2+C, the rate of this reaction varying greatly with different samples of coke. The volume of carbon dioxide reacting to give carbon monoxide and a surface oxygen layer on a sample of high temperature coke does not vary greatly with the partial pressure of carbon dioxide.

The results are used to elucidate the mechanism of the water gas shift reaction, to decide between various mechanisms that have been proposed elsewhere for the reactions betwen carbon and carbon dioxide or steam, and to explain some published observations on the gasification of coke in oxygen.

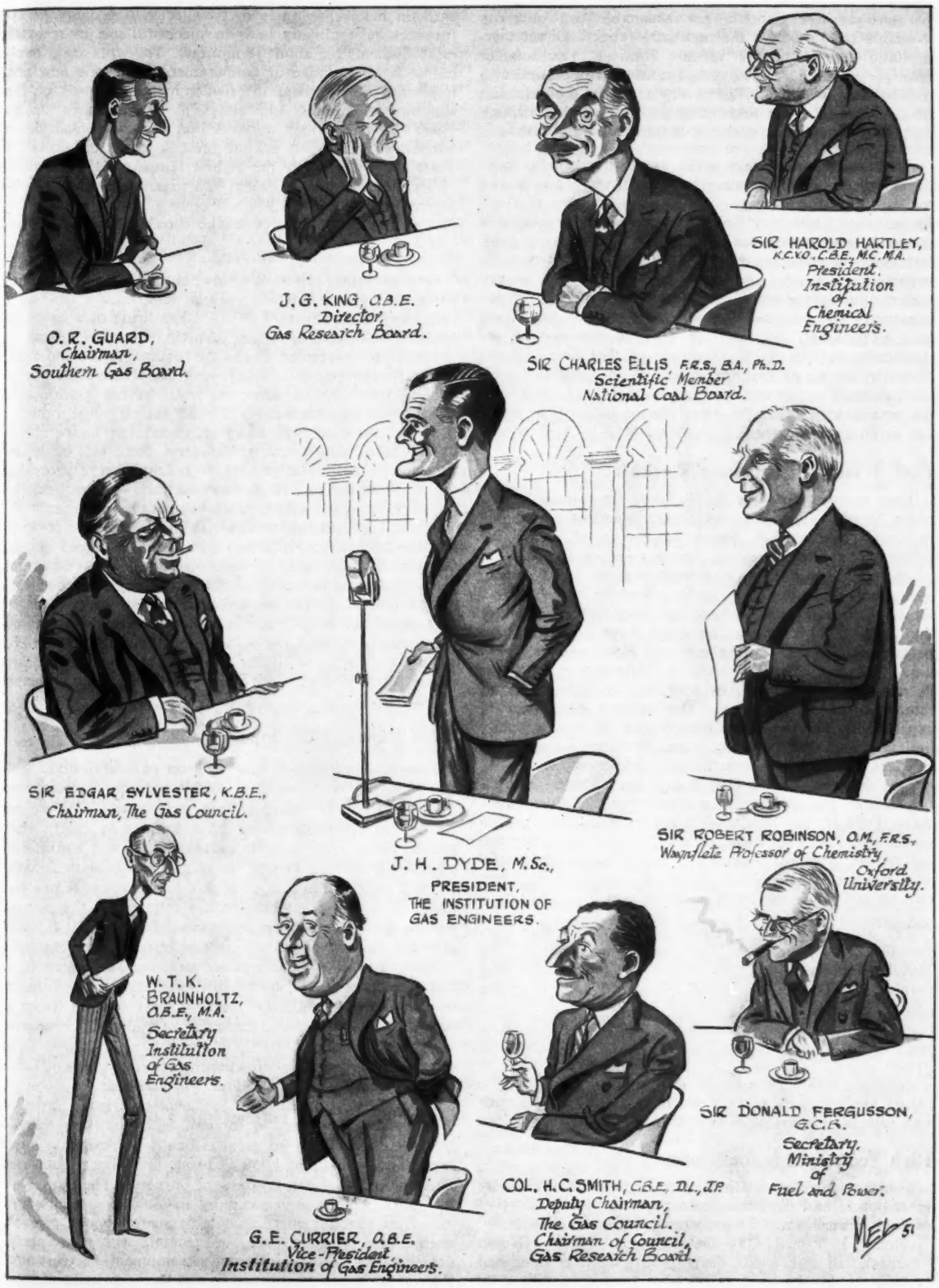
The meeting then adjourned, and in the interim there was the Research Luncheon at the Savoy Hotel. Our report of the speeches appears on p. 606.

Oxygen Recorder for Purification Plant

On resumption on the Tuesday afternoon the meeting had first presentation and discussion of a paper on 'A Magnetic Oxygen Recorder for the Automatic Control of a Catalytic Purification Plant,' by Dr. R. H. Griffith (North Thames Gas Board).

In the catalytic plant for the removal of organic sulphur compounds from coal gas, installed at the Harrow station of the North Thames Gas Board, the heat requirements of the process are provided by the interaction of hydrogen and oxygen on the catalyst. The successful operation of the plant depends on control of the oxygen content of the ingoing gas. The normal oxygen content of gas leaving the purifiers is not high enough for the catalytic process, and a small proportion of air is therefore added. The coal gas at Harrow is produced in a single horizontal retort house, so that the total volume of gas entering the plant, and its oxygen content, vary widely from time to time. The amount of additional air required therefore changes. For the best performance of the plant it is very important that the temperatures be kept steady, and this can only be achieved by maintaining a constant percentage of oxygen in the gas.

For several years, owing to the war, the plant was operated by manual control of the volume of air added, but it was recognised that this method was neither satisfactory nor economical. Thermostatic controls of conventional design were considered, but they proved to be unsatisfactory because of the high heat capacity of the catalyst and steelwork, which causes a long delay between adjustment of air addition and corresponding change in catalyst temperatures. Although a flow-ratio controller could be used to correct the air addition immediately the gas rate altered, and this ratio could be reset by a tem-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SIR DONALD FERGUSSON, G.C.B. Secretary, Ministry of Fuel and Power.
MEL 51

Personalities at the Research Luncheon of the Institution of Gas Engineers as seen and depicted by the famous caricaturist 'Mel.'

perature-sensitive element, no reasonable controller is available to work over the necessary range. Direct thermostatic control of the process from a thermometer arranged to measure the average catalyst temperature also proved unsatisfactory. Difficulties arose in the selection of the control point and of loss of sensitivity through the use of a corrosion-resistant thermo-couple sheath.

Attention was therefore given to other methods, those depending on the magnetic properties of oxygen appeared to be the most attractive. The Fulham laboratory of the former Gas Light and Coke Company had developed a magnetic oxygen meter as a laboratory instrument in 1946, but this subsequently proved insufficiently robust for works process control. An alternative type of magnetic oxygen meter, and its application to the control of the oxygen content of the coal gas stream, has now been developed by George Kent, Ltd., and Dr. Griffith expressed his indebtedness to Mr. R. S. Medlock, of that firm, for his efforts in the design and application of an instrument with the necessary sensitivity for use on coal gas. Details of the equipment and of the principles on which it is based are given in the paper.

Coal Travel in Continuous Verticals

Then came a paper by C. H. Lewis (Research Department, North Thames) on the measurement of coal travel in continuous vertical retorts by means of radioactive tallies. The importance of regular and uniform travel of the charge in a continuous vertical retort is, of course, well recognised, but the author observes that hitherto the only direct evidence of the nature of the irregularities that occur has been that obtained from quenching experiments. He goes on to say that the quenching technique provides extremely valuable information, but that its application is limited, by economic considerations, to retorts due for demolition. The number of quenching experiments that may be carried out is thus virtually limited by the obsolescence rate of retort houses, and the fact that no such experiments have been carried out by the North Thames Gas Board since those reported by Haffner and Weston is a direct result of this limitation. Further, the results obtained in quenching experiments have been criticised on the grounds that, because the retorts involved were at the end of their useful life, irregularities in coal travel which may not exist in newer retorts are likely to become prominent.

The use of refractory tallies in new retorts has been considered as a means of determining the mean rate of travel; location of the tally in the discharged coke may involve the close examination of several tons of coke, and there may be considerable uncertainty as to the precise time of discharge. This method can, of course, yield no information as to the path of travel of the tally in the retort. The paper by Mr. Lewis gives details of a technique which, he suggests, is capable of general application and provides a fairly complete picture of the path and rate of descent of a tally through a working retort.

High Temperatures for Industry

The first day's proceedings were brought to a close by presentation and discussion of a paper on the production of high temperatures in industry by town gas by R. F. Hayman, Industrial Gas Development Officer (North Thames). In this paper development work is described leading up to the production of a furnace designed to operate economically at a temperature of 1,450°C. Already there is evidence of the need for such furnaces for research work in fields ranging from metallurgy to geology. Two furnaces have already been in successful use in research establishments for about 18 months. Thoughts are extending to a wider range of temperatures, since one new and important development in powder metallurgy will be the sintering of metals and alloys at temperatures up to 1,800°C. The author remarks that the theoretical flame temperature of town gas at present is of the order of 2,000°C., and possibly the highest temperature practicable of attainment without preheat in a reasonable size of working chamber is about 1,900°C. Here again the production of very high temperatures can be considered in more than one way.

One important system is already employed in the original firing during manufacture of high temperature insulating refractory and refractory bricks. The firing of a batch of bricks is a careful operation involving the slow raising in temperature of a sealed kiln to the required figure and then, after an appropriate time, allowing the whole structure to cool. In such a kiln dense materials having considerable strength at high temperatures, and taking some time to heat up, are used. If, however, these high temperatures are to be of any service to industry, there will be many occasions when, as at present, high temperature processes will have to be carried out in one shift or one working day. This means a totally different outlook on the problem, necessitating insulating refractories and refractories possessing the ability to withstand substantial thermal shock. Further, materials will not necessarily be used to construct a large and solid kiln which is filled with objects to be fired, sealed, heated up, and subsequently cooled; instead, chambers may have to be made in which work to be processed is frequently inserted and withdrawn. This will involve hot walls and hearths of lighter and thinner sections, possibly in the form of tiles. This aspect of the problem is being considered.

More Violent Heat Inputs

Low pressure burners operating on natural draught will not fulfill the duty required, and it becomes necessary to think in terms of more violent heat inputs. Work has started on the development of a furnace to reach what can be called very high temperatures. It was considered essential to have a high pressure gas burner with forced-draught air preheated to as high a temperature as practicable. It was also essential to use refractories that would survive the high temperatures planned (up to 2,000°C.) and also the thermal shock occasioned by rapid heating. At temperatures of the order considered, the author remarks, full advantage should be taken of radiation from furnace walls and roof, since the ratio of heat transfer from a furnace roof down on to the stock by radiation compared with convection at 1,800°C. is about 60:1. And he goes on to comment that building experimental furnaces of large size is a costly operation and will have to be done in collaboration with industry. Sufficient experience has now been gained, however, to forecast with some confidence that there should be no great difficulty in designing large furnaces to operate at 1,450°C. using insulating refractories and low pressure natural-draught burners. The nature of the work will be influenced by available materials and industrial requirements. Available materials, at present, enable gas to keep pace, in general, with the special demands of industry. Recent developments suggest that there is no reason why materials and the knowledge of their application should not be at the service of industry as new demands become apparent.

Refractories and Pure Sulphur Recovery

Wednesday morning's session started with presentation (by Dr. A. T. Green, O.B.E., Director of Research of the British Ceramic Research Association) of the 42nd Report of the Refractory Materials Joint Committee, 1950-51, and a joint paper by Dr. Green and T. F. E. Rhead (Chairman of the Refractory Materials Joint Committee of the Gas Research Board). These items were followed by a short paper by Dr. F. A. Burden and W. B. S. Newling (both of the Research Department of the North Thames Gas Board) on the recovery of pure sulphur from spent oxide. Provided certain precautions are taken, pure sulphur may be recovered from ordinary gasworks spent oxide by extraction with toluene. The authors state that the extraction is preferably carried out on dried oxide in the temperature range 100° to 110°C., between the boiling-points of water and toluene. The hot extract solution contains nearly all the sulphur and tar originally in the oxide, and is filtered free from oxide fines. It has now been found that crystals of pure sulphur can be formed from the tarry solution by slow cooling with continuous stirring, particularly if the solution is not allowed to cool below about 40°C. The tarry mother liquor may be separated from the sulphur crystals by drainage followed by rapid washing with cold toluene. It has also been found that the crystals contain an appreciable proportion of toluene which cannot be removed by ordinary drying methods, and this is driven off by fusing the crystals and heating the molten sulphur to 120°C. The solidified melt contains less than 0·1% of tar, and is equivalent in quality to the valuable material required for operation of the simplest type of contact sulphuric acid plant.

The laboratory experiments described in the paper formed the basis for a process which could provide, from ordinary gasworks spent oxide, sulphur suitable for burning in the simplest type of contact sulphuric acid plant. The process includes the following stages:—(i) Drying the oxide. (ii) Extraction of the dried oxide with toluene at not less than 100°C. (iii) Crystallisation by slow cooling at a rate not greater than 25°C. per hour and with continuous agitation. The crystallisation should be limited to temperatures above 40°C., unless the tar content of the extract solution is fairly low (*e.g.*, 1% of the sulphur content). (iv) Fusion of the drained and washed crystals, with heating to 120°C. to remove all toluene and volatile organic matter. A pilot plant has been constructed to study the process on a larger scale.

Welding and Stress-corrosion Cracking

Then came a report, submitted by the F.M. 9 Committee (Chairman, Mr. C. Cooper, W. C. Holmes and Co., Ltd.), the British Welding Research Association, on 'Investigations into the Stress-corrosion cracking in Welded Gas Mains.' In this report, prepared by Mr. L. W. Kastell, Technical Secretary to the Committee, it is recorded that, in spite of careful examination of the evidence, the cause of stress-corrosion cracking in gas purifying plant is still obscure. The high stresses set up by welding are a contributory factor, but the difficulty so far experienced in the laboratory of producing cracks with gas liquor has left the Committee with no proof regarding the constituents in the gas liquor that act as the corrodant or corrodants. Evidence as to what constitutes an aggressive condition in crude coal gas, obtained from examination of approximately 30 characteristic failures, shows that (i) water gas alone does not appear to provide any failures, (ii) that failures in coke oven gas and in horizontal retort gases are rare, and (iii) that the preponderance of corrosive attack is heavily on the side of continuous vertical retort gas. Comparisons of ammonia, H_2S content, oxygen content, and nitric oxide have not shown a specific bearing. Low viscosity of tar, and presence of a tar precipitator before the effected region, show a slight probability of favouring attack, and so do gas temperatures above the normal atmospheric level. One outstanding result is general: ammonia must be present for corrosion to occur, for corrosion cracking is almost unknown after the ammonia washer. It is very improbable in the hot gas region where tar in quantity exists. A few cases are recorded of corrosive attack on atmospheric gas cooler shells and on the casings of electrostatic tar precipitators. It is believed that the more massive constructions remain relatively resistant to corrosion, and there has been noted a significant detail—that the steel inlet branch of an ammonia washer may not exhibit cracking where the pipes immediately before it are strongly attacked. The best way to determine the exact nature of the most troublesome corrosive agent would seem to be to employ an investigator to undertake a survey of gas streams in different plants to find the differences existing in gas liquors in those plants in which cracking occurs, as compared with those from which it is absent.

Another factor that may influence the apparent random nature of cracking has been discussed by the Committee, and may be of some importance. This arose out of a suggestion that some external stresses might be present in those mains in which cracking occurs. Such stresses could be due to ground subsidence, pulsations from exhausters, exaggerated thermal fluctuations, additional stress imposed at pipe bends, or other mechanical stresses. One manufacturer has made a thorough survey of the installations where cracking has been reported, and it was concluded that, in all cases examined, the existence of such stresses could not be disregarded.

A Remedy

In regard to a remedy, the Committee has been rather more fortunate. This is mainly due to the fact that the trouble was serious; and, as soon as it seemed possible to overcome it by means of stress relieving the welded pipe, many manufacturers installed replacements in the stress-relieved condition. Stress relieving in most cases was obtained by heat treatment at 450° to 500°C. and no case of premature failure of these stress-relieved mains has been reported to the Committee. The earliest stress-relieved replacement was made in April, 1945. The value of stress-relieving temperatures lower than 400°C. is based entirely on the laboratory tests using hot nitrate solutions, and, therefore, may be open to some doubt for gas liquor cracking. However, the good correlation that has been obtained between the nitrate tests at Newcastle and the field tests at Margam seems to suggest that, until an accelerated form of gas liquor cracking is obtained in the laboratory, nitrate tests might be taken as a good guide to the susceptibility of a steel to this form of cracking. The Committee has not, however, entirely ruled out the possibility of testing a main built from sections that have been subjected to various methods and degrees of stress relief, but the cost of such an experiment might be difficult to justify even if low temperature stress relief were found to be satisfactory. It is also doubtful whether the gas industry would make much use of peening, although it might be shown to give welded mains a sufficient measure of stress relief.

Among the conclusions drawn in the report are that the cracks are inter-crystalline and typical of other examples of stress-corrosion cracking; the cracks are associated with the welds, and cracking invariably starts from the inside of a main; the cracks are frequently associated

with irregularities in the weld bead, *e.g.*, where tack welds have been made. Failures are almost invariably located between the gas cooling plant and the ammonia washers, and it seems possible that external stresses additional to the internal stresses imposed by welding are necessary for failure to occur. Stress relief of weldments by heat treatment at 450° to 500°C. for 1 hour has been found to give immunity from these failures.

Flames and Burners

The session on Wednesday morning ended with a paper by W. A. Simmonds and A. L. Willett (Gas Research Board) on target impact gas burners. In this the authors explained that the performance of a new type of non-aerated burner has been investigated. The burner is of simple design and consists of an orifice by means of which a jet of gas is directed towards a target. The effect of this target is to turn the jet into a thin sheet of gas in the form of a disc flowing away from the jet. The flame stabilises itself at some position on this sheet of gas and a disc of flame is thus obtained. The stability and flexibility of this type of flame have been investigated and sufficient results have been obtained to indicate the possibilities of these flames.

The investigation has, so far, included the effects on the flame of the rate of supply of gas, the diameter of the orifice, the diameter of the target, and the distance between the orifice and the target. Although the experimental work described has been limited to the use of a single jet, it is clear that any number may be used. Work is still in progress, and is being continued to cover the effects of factors not yet investigated such as target shape, curvature, and orientation, gas quality, and the number of jets.

The assembled burner will be simple in design and easy of manufacture, the flame may be shaped to meet requirements, and in some circumstances the target itself may be the surface which it is desired to heat. The target impact burner, the authors conclude, combines the usual advantages associated with non-aerated burners with the relatively small volume of flame for a given heat release common to turbulent flames.

Together with M. J. G. Wilson, also of the Gas Research Board, Mr. Simmonds was responsible for the first paper at the final session of the meeting on the Wednesday afternoon. This was entitled 'The Entrainment of Air by Flames,' and it described experimental techniques which have been adapted and tested for following the path of secondary air towards and into flames. These methods have been applied to small, radially symmetrical flames of methane, hydrogen, and town gas over a range of rates of flow. In this way the flow patterns have been mapped and measurements of the velocity of the air movement towards the flame have been obtained. The results show that the amount of air entrained into the column of hot gases surrounding the flame at levels below the top of the flame varies only sighty with the rate of flow of gas and with different gases. Apart from the region close to the burner, it has been found that the amount of air entrained increases rather less than in direct proportion to the height above the burner top. The powder method of flow visualisation used in this work is applicable to other fluid flow problems such as tracing the path of products of combustion through ovens and furnaces, and investigating the movement of air in front of fires.

Effluent Liquor Purification

We then came to the last two contributions at the meeting, both dealing with the ever-present problem of effluents. The first was by C. Cooper and W. E. Bouch (W. C. Holmes and Co., Ltd.), whose paper discussed the possibilities of using nitric acid and nitrous acid for the destruction of the residua toxic matter in ammonia still effluents and other effluents from gasworks. The effect of the reactions is to destroy the inorganic salts, such as thiosulphate and thiocyanate, the products of decomposition of nitric acid being largely recoverable for further employment after the gases evolved have been oxidised with air. Consequently, the total effect is to accomplish the conversion of these salts to comparatively harmless substances by indirectly employing atmospheric oxygen. Phenolic matter which is present combines with nitric acid, which is thereafter unrecoverable. Nitric acid or nitrogen oxides for these purposes can be obtained by the catalytic conversion of ammonia.

The authors point out that the presence of chlorides, which is almost universally to be expected, has important effects on the course of the reactions. Primarily, chloride reacts in a manner that assists the decomposition of the other ammonia salts, but reaction will persist between ammonium chloride and nitric acid in solution, if allowed, after the process has reached its desired conclusion. Nitrated phenols will exist in treated solutions and may require removal.

It is also indicated in the paper that, where solutions of thiocyanate of fairly high concentration are available, the possibility exists of a remunerative recovery of hydrocyanic acid. The important matter of costs is considered, in conjunction with the costs of previous dephenolation treatment and the alternative costs of disposal of effluents of normal content of toxic substances.

It is explained by the authors that the investigations arose from preliminary observations of the fact that a hot ammonia still effluent could be caused to react with nitric acid in such a manner that toxic constituents of the liquor were oxidised and decomposed, and that the oxides of nitrogen that were evolved were such as could be reconverted into higher oxides and potentially back to the form of nitric acid. Such an effluent with an oxygen absorption figure of 1,000 was brought down by this treatment to approximately 50 O/A, and when the treatment was continued by contact with activated carbon, the product was an effluent with an O/A figure between 5 and 10. These observations, they state, appear to indicate the possibility of an effluent treatment process of a more universal application than is represented by dephenolation only, and also probably one that would demand a lesser extent of capital construction than those required for complete effluent elimination.

As an oxidising agent, nitric acid or other nitrogen oxyacids or nitrogen oxides appeared to have two advantages. One of these was the recoverability of the primary reagent, and the second the fact that nitrogen oxides can be produced from ammonia, within the gas producing plant itself where conditions were favourable. Starting from these comparatively simple considerations, it was early found that while a few simple chemical equations could easily be written down to account for most of what went on, there was a great deal to learn, and the more recent history of the investigation is that there is still more to learn.

Finally we had the paper by Dr. W. H. Blackburn (Gas

Research Board) and T. G. Tomlinson and T. H. Summers (Water Pollution Research Laboratory, D.S.I.R.) on 'The Treatment of Gasworks Liquor in Admixture with Sewage in Percolating Filters.' It was in 1949 that the Gas Research Board appointed an Advisory Panel on Ammonia Effluents. It was decided that one part of the research programme should be directed towards the identification and estimation of the constituents present in gas liquor. It was recognised, however, that this was a long term investigation and it seemed that progress would be facilitated if gasworks liquor could be divided into a number of fractions (not necessarily pure compounds) and the effect of each fraction on sewage purification determined separately. Attention could then be directed towards those fractions which were shown to be most harmful. A method of separation of gas liquor into a number of fractions has been devised and the effects of the resulting fractions on sewage purification have been investigated in a small scale experimental plant, comprising eight filters and dosing apparatus, erected at Stivichall, Coventry.

Both sections of the work at Stivichall have been carried out by the Water Pollution Research Laboratory in collaboration with the Liquor Effluents of the G.R.B. The work on fractionation of gas liquor has been done in the Gas Research Laboratory of the University of Leeds.

In the first section of the paper the results are reported of an investigation of the effects of spent vertical retort liquor on the treatment of sewage in full scale percolating filters. It is hoped later to give the results of experiments with other types of gasworks liquor resulting either from modified gasworks practice or from special treatment of the liquor. The second section deals with the method of separation and the treatment of seven fractions of crude vertical retort liquor in admixture with sewage in small scale experimental filters.

The trials with spent gas liquor showed that addition of the liquor in a concentration of 0·5% by volume caused a significant deterioration in the chemical quality of the effluent and caused some increase in intensity of colour. The trials with the fractions of crude liquor were made in percolating filters, each 1 ft. in diameter. The greatest deterioration in the quality of the sewage effluent was caused by the addition of two fractions, one containing thiocyanate, ammonia, and organic substances not extracted from the crude liquor by methyl isobutyl ketone, and the other containing carboxylic acids and humic acids. Of the four fractions into which the phenols were divided, the two containing polyhydric phenols caused a significantly greater deterioration in the quality of the effluent (as measured by the test for oxygen absorbed from permanganate) than did the two containing monohydric phenols, but the effect of all four fractions on the biochemical oxygen demand of the effluent was very similar. The bearing of these results on the practice of hot gas de-tarring is discussed in the paper.

Vote of Thanks

Following the announcement by the Secretary of the elections to membership (Mr. F. B. Richards, M.B.E.; Hon. Member; 17 Members; 68 Associate Members; 120 Associates), Mr. C. R. M. Croft (Sussex division, South Eastern Gas Board) moved a vote of thanks to all who had contributed to the proceedings of the meeting. Mr. Croft paid tribute to the work of Dr. Braunholtz and his staff and to the manner in which Mr. Dyde had conducted the meeting. The vote was seconded by Mr. J. D. C. Woodall (Maidstone group, South Eastern Gas Board).

The meeting closed by good wishes from the Association Technique de l'Industrie du Gas en France, expressed by M. Renauldon, a member of the Committee of the Association.

Personal

Mr. Frank A. Ridley has been appointed to represent Sawer and Purves, in conjunction with Mr. D. Martin, in the East Midlands, West Midlands, Eastern, and Southern area boards' territories. He has served many years in the steel industry and relinquishes the post of North West Area Representative for the Talbot Stead Tube Co., Ltd.

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Mr. David Muir has been appointed to represent George Orme and Co. in the territories of the West Midlands and the Wales area boards. Mr. Muir formerly held the appointment of Technical Representative with Helliwells, Ltd., Treforest. He is an associate member of the Institution of Production Engineers, and an associate of the Institution of Gas Engineers.

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Mr. D. T. Livesey, after 17 years as Engineer and Manager at Doncaster, will be retiring at the end of the year. He received his training with his father, who was Engineer, Manager, and Secretary of the East Grinstead Gas and Water Company, and later became works chemist and assistant at Harrow and Stanmore. He went to Doncaster in 1926 as works superintendent and chief assistant to the manager and was appointed Engineer and Manager in 1934.

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Mr. John L. Anstey, Midland Representative for the Parkinson Stove Co., Ltd., has been elected President of the Warwickshire Rugby Football Union. He succeeds Mr. E. J. Corbett, of Coventry, who died in October. Mr. Anstey has been closely connected with football and cricket in the Midlands for many years. President of the Warwickshire Society of Referees and the Kenilworth Rugby Football Club, he is also a member of the Warwickshire County Cricket Club and an active playing and committee member of the Coventry and North Warwickshire Cricket Club.

Mr. John K. M. Snell has been appointed to represent J. & J. Braddock in the territories of the Northern, North Eastern, and East Midlands area boards. After having served 22 years in the gas industry, Mr. Snell relinquishes the post of Sales and Service Superintendent to the Worksop undertaking of the East Midlands Gas Board. He is a member of the Incorporated Sales Managers' Association.

Obituary

Dr. F. R. Weston, B.SC., PH.D., A.R.C.S., D.I.C., F.R.I.C., Station Engineer at the North Thames Gas Board's Bow Common Works, died suddenly last week. He was 49 years old and had been with the former Gas Light and Coke Company and with the Board since 1926, when he joined the Chief Engineer's department as a chemist in the Fulham research laboratory. In November, 1941, Dr. Weston was appointed station chemist at Kensal Green works, and was later transferred to Nine Elms works, first as station chemist and subsequently becoming senior assistant engineer. On May 1, 1949, he was appointed Station Engineer at Bow Common. Dr. Weston graduated at the Royal College of Science and did a great deal of research with the late Professor Bone on problems connected with carbonisation and guarantee tests. In association with Professor Bone, he produced a paper entitled 'Flame Spectra of Carbon Monoxide and Water Gas,' and this was followed by other papers on kindred subjects. He was one of the first to be awarded a Gas Light and Coke Company Fellowship when he was at the Royal College of Science.

Diary

Dec. 7.—Northern Juniors: Short paper meeting for President's Prize, Three Tuns Hotel, Old Elnet, Durham, 2.30 p.m.

Dec. 8.—Western Juniors: 'Transport,' A. G. Thorne, and visit to Bath gasworks, 2 p.m. Silver Jubilee Dinner, Fortts Restaurant, Bath, 6 for 6.30 p.m.

Dec. 8.—Scottish Juniors (Eastern and Western):—Joint meeting, 'Power Generation in Gasworks,' W. A. Train (W. H. Allen & Son, Ltd., Bedford), Heriot Watt College, Edinburgh, 3 p.m.

Dec. 11.—Midland Juniors: 'Planning and Development of a 6 mill. cu.ft. Vertical Retort Installation and Ancillaries,' A. W. Sanders (Leicester). Staff Mess Room, Birmingham.

Dec. 11.—Wales Juniors (South): Students' Paperette Day, Cardiff.

Dec. 12.—South Western G.C.C.: 34, Bridge Street, Taunton, 11 a.m.

Dec. 14.—Manchester and District Section, I.G.E.: 'The Economics of Gas Production,' T. Nicklin, M.SC., Production Engineer, North Western Gas Board. Grand Hotel, Manchester, preceded by luncheon.

Dec. 15.—Yorkshire Juniors: 'Carbonisation,' J. Burbridge, York.

Dec. 18.—London and Southern Section, I.G.E.: 'Recent Developments in Oxide Purification Plants,' G. U. Hopton (Research Chemist, North Thames Gas Board). 17, Grosvenor Crescent, 2.30 p.m.

Dec 18.—Institute of Fuel: 'Gasification by the Moving-Burden Technique,' by J. W. R. Rayner; Institution of Mechanical Engineers, Storey's Gate, St. James's Park, S.W.1, 5.30 p.m.

Jan. 1.—East Midlands G.C.C.: Victoria Station Hotel, Nottingham, 11 a.m.

Jan. 1.—South Eastern G.C.C.: Caxton Hall, Westminster, 2.30 p.m.

Jan. 9.—Manchester Juniors: 'Consideration of Power Production on Gasworks,' T. Andrews (Production Section, Liverpool). At Manchester.

BRITISH STANDARD FOR PRESSURE GAUGES

This British Standard has been drawn up to deal with the wide variety of pressure gauges that are in general use throughout industry and which may be bought in large quantities under contract or as single units from engineering suppliers. It is hoped that the use of this standard will result in a reduction of the number of types and sizes in use with consequent benefit to the user in case of replacement and to the manufacturer in the reduction of production difficulties.

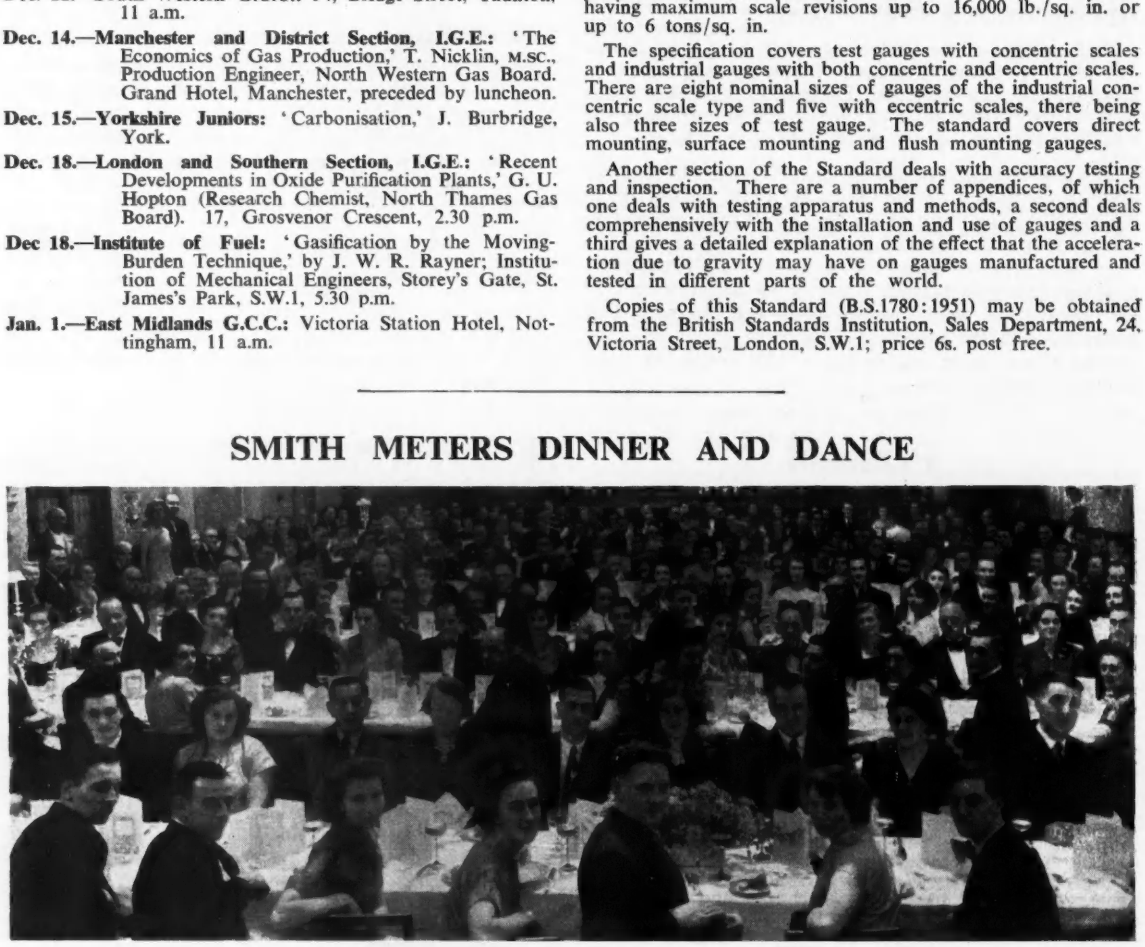
The standard deals with indicating pressure gauges, vacuum gauges and combined pressure and vacuum gauges of the Bourdon tube type from 2 in. to 12 in. nominal size and having maximum scale revisions up to 16,000 lb./sq. in. or up to 6 tons/sq. in.

The specification covers test gauges with concentric scales and industrial gauges with both concentric and eccentric scales. There are eight nominal sizes of gauges of the industrial concentric scale type and five with eccentric scales, there being also three sizes of test gauge. The standard covers direct mounting, surface mounting and flush mounting gauges.

Another section of the Standard deals with accuracy testing and inspection. There are a number of appendices, of which one deals with testing apparatus and methods, a second deals comprehensively with the installation and use of gauges and a third gives a detailed explanation of the effect that the acceleration due to gravity may have on gauges manufactured and tested in different parts of the world.

Copies of this Standard (B.S.1780:1951) may be obtained from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1; price 6s. post free.

SMITH METERS DINNER AND DANCE



THE annual staff dinner and dance of Smith Meters, Ltd., was held at the Caxton Hall, Westminster, on November 24, when over 350 guests were entertained by the Company.

Mr. A. T. Wallington proposed the toast of the Chairman and Directors. Mr. Norman L. Smith, in his reply thanked the staff for loyal and co-operative service, which had resulted in the continued rise of output. On 1946-50 figures a 47% output increase was shown on the pre-war 1929-39 period and 1951 would show an 88% increase. If the gas meters delivered from the Kennington works this year were laid side by side, they would make a continuous line from London to Southend. A meter was produced every 45 seconds throughout the factory working hours.

To enable Kennington to achieve this output of complete gas meters, the Streatham works had delivered to them 16 mill. components. But this was only 42% of Streatham's output. These were record output figures for the Company in its 117th year, and Smith Meters was today without question one of the largest meter organisations on a productive basis not only in this country, but in the world.

The toast of the Guests was proposed by Mr. R. W. E. Gaskin and responded to by Mr. R. Overton.

Gas Council Organisation for Research

Statement at the Research Meeting of the Institution of Gas Engineers by Colonel Harold C. Smith, Deputy Chairman of the Gas Council and Chairman of the Gas Research Board.

ONE of the early matters to which the Gas Council gave consideration after vesting date was the future organisation of research in the gas industry. The first step taken was to carry out a survey of the work then being undertaken and of the numbers of research workers engaged. We were indeed fortunate that we were able to secure the help of Dr. W. T. K. Braunholtz, the Secretary of the Institution of Gas Engineers, to conduct this survey. The report which he produced as the result of his investigation formed the foundation on which the future plan for the organisation of research was built. In considering the duties placed upon it by Section 3 of the Gas Act, the Council has considered that its prime responsibility is for fundamental research, which it defines generally as seeking fundamental knowledge of existing processes and knowledge likely to lead to new ideas, processes, and products, and their development, where appropriate, up to and including the pilot plant stage. The normal development of existing processes and appliances, in the Council's view, is a responsibility which might properly be undertaken by area boards. The Council appreciates, however, that there will be marginal cases on which decisions will have to be taken as and when they arise. The Gas Council was very conscious of the good work which had been done by the Gas Research Board and gave serious consideration to the suitability of that Board as a machine for satisfying the duties imposed on the Gas Council. The view was taken that the Gas Research Board as constituted could not be considered an appropriate body for the purpose of satisfying these requirements. In May, 1950, the Chairman of the Gas Council, Sir Edgar Sylvester, attended a meeting of the Council of the Gas Research Board at their invitation and informed them that the Gas Council was setting up a Research Committee to advise on the organisation and conduct of research and indicated the probable form of this organisation. The Council of the Gas Research Board printed in its Twelfth Annual Report, 1950, 'After much discussion we took the view that, having regard to all the circumstances, we were not able to offer any suggestions by way of seeking to vary the general policy of the Gas Council. At the same time we, in common with the Gas Council, were greatly concerned that the work of the Gas Research Board should continue without interruption or diminution and that the staff should have a clear assurance as to their future. In response to our enquiry, the Gas Council indicated that they would be willing to accept responsibility for the work of the Board and for the future of the staff. We are now giving further consideration to the steps which should be taken to effect this transfer of responsibility.' While the Gas Council is the major contributor to the finances of the Gas Research Board it has no representation on the Council of the Board and, indeed, is not in its own right a member of the Board. The Council of the Gas Research Board consists, in addition to the President and Vice Presidents, of nominees of the Institution of Gas Engineers, the Society of British Gas Industries, and of the Department of Scientific and Industrial Research.

Gas Council Research Committee

While I am at the moment Chairman of the Council of the Gas Research Board I am a member of the Council of that body as a nominee of the Institution of Gas Engineers. I accepted the office of Chairman on April 11, 1951, in order to assist in seeing that the transfer of the work being done and of such staff as were agreeable from the Gas Research Board to the Gas Council was effected as smoothly and as expeditiously as possible. In the interests of research in the gas industry and particularly of the research workers themselves I sincerely hope that the proposals which the Council of the Gas Research Board are likely to put before their members in the near future will prove acceptable.

The Gas Council has appointed a Research Committee to advise on the implementation of Section 3 of the Gas Act. The Committee is constituted as follows:—

Sir Edgar Sylvester, K.B.E., F.C.A. (Chairman of the Gas Council), Chairman.

Colonel H. C. Smith, C.B.E., D.L., J.P., M.I.C.E., M.INST.GAS E. (Deputy Chairman of the Gas Council), Deputy Chairman.

Sir Robert Robinson, O.M., F.R.S. (Waynflete Professor of Chemistry, University of Oxford).

Sir Cyril Hinshelwood, F.R.S. (Dr. Lee's Professor of Chemistry, University of Oxford).

Professor F. H. Garner, O.B.E., PH.D., M.I.MECH.E., M.I.CHEM.E., F.R.I.C., F.INST.PET. (Professor of Chemical Engineering, University of Birmingham).

Professor A. L. Roberts, PH.D., F.R.I.C. (Livesey Professor of Coal Gas and Fuel Industries, University of Leeds).

Mr. E. Crowther, C.B.E., M.ENG., M.I.C.E., M.INST.GAS E. (Chairman, Northern Gas Board).

Dr. R. S. Edwards, PH.D., B.SC., A.R.C.S. (Chairman, North Eastern Gas Board).

Mr. W. K. Hutchison, B.A., B.SC., M.I.CHEM.E., M.INST.GAS E. (Chairman, South Eastern Gas Board).

Mr. G. le B. Diamond, C.B.E., M.I.MECH.E., M.INST.GAS E. (Chairman, West Midlands Gas Board).

Mr. F. M. Birks, C.B.E., M.I.C.E., M.INST.GAS E. (Deputy Chairman, North Thames Gas Board).

Mr. J. H. Dyde, M.SC., M.INST.GAS E. (President of the Institution of Gas Engineers).

Dr. H. Hollings, O.B.E., F.R.I.C. (Director of the London Research Station).

Dr. F. J. Dent, D.SC., PH.D. (Director of the Birmingham Research Station).

This Committee has reviewed the research which has been conducted in the Industry by the Gas Research Board and the area boards and, on the recommendation of this Committee, the Gas Council has established two research stations. The first to be established was by agreement with the North Thames Gas Board under which that Board's laboratories at Fulham were recognised as the nucleus of a Research Station, Dr. H. Hollings being appointed Director of Research in charge of that Station. Recently, a second Station has been established in the West Midlands Gas Board's area and I am very pleased to be able to say that Dr. Dent, who was Assistant Director of the Gas Research Board, has been appointed Director of Research of this second Research Station. Possibly a third Research Station may be established at a later date.

Discussion of Results

By agreement with the Gas Research Board the work on complete gasification which was being carried out at Poole has been transferred to the West Midlands Research Station under the control of Dr. Dent. The staff who were engaged on the work at Poole have been offered appointments at the new Research Station and all of them have accepted. It is the intention of the Gas Council to accelerate the pace at which this work was proceeding, the first priority has been given to the investigations to be carried out on complete gasification. Again, by agreement between the Gas Council and the Gas Research Board an investigation is being carried out by a small Panel of the Gas Council's Research Committee into the work at present being done at Beckenham. It is of the greatest importance that work which is of value should proceed as quickly as possible and that the research workers who are working on this should not be discouraged by any change in the organisation for research.

'The long standing connection with the University of Leeds, which has proved of such great value to the Gas Industry, and I am assured to the University also, will be maintained, and to this end arrangements are being made for the reconstitution of the Joint Research Committee as a Joint Committee of the Gas Council and the University.'

It is the intention of the Gas Council to collaborate in the most practical way with the member firms of the Society of British Gas Industries who are doing research of interest to the industry. Discussions are taking place with the S.B.G.I. to arrive at the most effective method of collaboration. It is also the intention of the Gas Council to disseminate the results of work carried out to those likely to be interested, and to provide for its discussion, and I very much hope that the platform of the autumn research meetings of the Institution of Gas Engineers will be available for this purpose.

Concluded on p. 607.

Need for Elasticity in Research

SPEAKING at the Seventeenth Annual Research Luncheon of the Institution of Gas Engineers at the Savoy Hotel, London, on November 27, Sir ROBERT ROBINSON, O.M., D.SC., F.R.S., F.R.I.C. (Waynflete Professor of Chemistry, Oxford University, member of the Gas Council Research Committee), said that we must prepare by research over a wide field for changes in the basic fabric of the industry which are likely in the first instance to affect particular uses rather than any one large aspect. 'We cannot,' he remarked, 'be blind to any possibility in the fuel-power situation, and it must not be a question of waiting for such changes and adapting ourselves to them. We ought to be revolutionaries ourselves.'

Sir Robert Robinson was replying to the toast 'Our Guests,' proposed by Mr. J. H. DYDE, President of the Institution.

Mr. DYDE said that it was 22 years since the Institution introduced its autumn research meeting, and it thereby claimed with some justification to making the gas industry research conscious. While research and development matters occupied most of the programme, the committees engaged on current technical problems had to give an account of themselves, and the educational work was critically examined in the light of the results achieved. To carry through such a programme they were indebted to a great many people and to a great number of organisations. His first thoughts, therefore, were directed not unnaturally to a grateful acknowledgement of those of the guests who had given of their time, experience, and expert knowledge in contributing to the proceedings—the authors of papers and reports, and the various research, technical and educational authorities who made their work possible. In the field of research they had Sir Ben Lockspeiser, Secretary of the Department of Scientific and Industrial Research, and the Gas Research Board, as represented by its Vice-President, Sir Harold West, and its Director, Dr. King. They welcomed, too, most of the members of the Gas Council's new Research Committee, including Sir Robert Robinson, Professor Garner, and Professor Roberts, with two directors of new research centres, Dr. Hollings and Dr. Dent. No fewer than seven other research associations were represented by their directors. In the important field of education they welcomed the Under-Secretary of the Ministry of Education, the Director of the Department of Technology of the City and Guilds of London Institute, and representatives of the Association of Teachers and Principals of Technical Institutions. As representing higher education they acknowledged the honour paid to them by the presence of representatives of a number of the universities, including that of Leeds with whom they had a long and profitable association through the Livesey Professorship and the Institution Gas Research Fellowship. All the great engineering institutions were represented by their presidents, as indeed were those professional associations, institutions, and societies which served the chemical and fuel industries.

The Institution, with 75% of its members employed in a State industry, would find it difficult to function as a professional body without the goodwill, indeed the active support, of the Gas Council and the area boards. That such support had been forthcoming and that the Institution's work and beneficial influence on the industry had been recognised was one of the most encouraging features they had experienced since nationalisation. It was with great pleasure, therefore, that they welcomed the Chairman, Sir Edgar Sylvester, the Deputy Chairman, Colonel H. C. Smith, and the chief officers of the Gas Council. In added support were 11 Chairmen of area boards, among whom he was privileged to greet his own Chairman, Sir John Stephenson.

Elasticity of Thought

Sir ROBERT ROBINSON, O.M. (Waynflete Professor of Chemistry, Oxford University; member, Gas Council Research Committee) responded to the toast. Referring to education, and in particular to the 28th Report of the Institution Gas Education Committee, he congratulated the Institution on the way in which it was maintaining and raising the standards of the gas profession. They felt some sympathy, however, with the aspiring young. Failures in different examinations, he read, were 40%, 50% and 60% and the report truly stated that this was most disappointing. Approximately half of the candidates would no doubt heartily concur! The Prime Minister, while admitting that engineers had their place in the world, once stated that a world of engineers was not wanted. So far as gas engineers were concerned, it would seem that effective steps were being taken to meet the Prime Minister's point.

Continuing, Sir Robert remarked that he was a new boy in the Gas Council Research Committee and was not really competent to say, as was said on a somewhat similar occasion, 'I find it hard to exaggerate the value of your organisation, but I will do my best.' However, he was learning under admirable tutors, among whom he gave first place to Dr. Hollings. In due course he hoped to be able to discuss such matters as improvements in total gasification plants and the like, even with cognoscenti like themselves. The new research station at Birmingham was expected to be an important focus of research activity, and it would have the inestimable advantage of close contact with a great gasworks.

'We must,' he went on, 'prepare by research over a wide field for changes in the basic fabric of the industry which are likely in the first instance to affect particular uses rather than any one large aspect. An objective of research is to provide the maximum of elasticity; we cannot afford to be blind to any possibility of fundamental changes in the fuel-power situation, and it must not be a question of waiting for such changes and adapting ourselves to them. We ought to be revolutionaries ourselves. We all know about research and development and how necessary the latter is. But I think scientific advisory councils and implementation of their recommendations represent a striking parallel and are another complementary pair. If I may pursue this analogy, when research cannot be developed we do some more research and hope for better results. Apparently the Ministry of Fuel and Power has thought it necessary to apply this principle to the report of its former Scientific Advisory Council, which, under the Chairmanship of Lord Simon of Wythenshaw, was invited to consider the matter of the domestic use of fuel and power. A report was duly produced, but, so far as I know, action did not follow. A new committee has now been appointed to report on the same problems, but this time the precaution has been taken to keep it free from scientists, with one very distinguished exception, Professor Hawthorn. Professor Hawthorn will be able to understand and explain how the great kinetic energy of that Committee, with an active Chairman like Lord Simon, can be degraded and can become useless for any further action, apart from pigeon holing, with the efflux of time.'

Professional Pride

Mr. H. W. CREMER, C.B.E., M.SC., F.R.I.C. (President of the Royal Institute of Chemistry) proposed the toast of 'The Institution of Gas Engineers.' In doing so, he said that having some knowledge of the Institution's aims and aspirations, and achievements, he was in no doubt whatever that its service had been a great and honourable one, and it was therefore very fit and proper that gas engineers should take pride in their profession. Membership of the Institution fostered the professional spirit and the jealous observance of professional conduct. This professional spirit was of immense value to any industry, not one wit less in a nationalised industry as the gas industry, employing the large bulk of the Institution members. It was clearly to the industry's advantage that the Institution should be able to exercise freely those functions for which it was so well adapted under its Royal Charter, whatever the administrative organisation of the gas industry might be.

Mr. G. E. CURRIER, O.B.E. (Vice-President of the Institution of Gas Engineers), responding to the toast, said they were particularly gratified to hear from Colonel Smith, the Deputy Chairman of the Gas Council, that he hoped that the sharing of the Institution platform would continue in years to come. Also they were pleased that the President of the Institution, for the time being, was a member of the Research Committee of the Gas Council, and they also welcomed liaison with other research organisations. They had an example at the present meeting, in that they had a paper from the British Welding Research Association, and he suggested that they might also look in the future to the coal research organisations and to the oil industry.

Gas Staffs and Fares

THE British Gas Staff Association, represented by its General Secretary, Mr. Henfrey-Smith, gave evidence before the Transport Tribunal which is examining a case by the Transport Commission to increase fares by about 20% and to increase the minimum fares in London from 1½d. to 2d.

The Association claimed that the proposed increase of 20% could cause hardship and instanced a clerk in Grade B receiving a maximum salary in London of £455 per annum or £8 15s. per week. This typical employee, a married man with one child, had only £7 10s. as disposable income, said Mr. Henfrey-Smith, after paying his superannuation contributions, national health payments, tax and Association dues. Out of this remaining sum of £7 10s. he gave his wife £3 for housekeeping (for three people) and household maintenance, cleaning, toilet, etc.; rent £1 10s.; fuel 10s.; clothing 10s.; amusements 4s. 6d.; travel to work 9s. 6d.; meals out 10s.; leaving a balance for sundries, including holidays, savings, contingencies, etc., of 16s. per week.

'For a married man,' said the Association, 'in a clerical occupation, who has to maintain certain standards of appearance and desires to maintain a reasonable standard of living and culture, the Tribunal will agree that there is very little margin left'. The lower graded clerical staff of the gas industry were forced, therefore, to oppose even an average increase of 2s. a week in fares to work.

The proposed increase of the minimum fare from 1½d. to 2d. would undoubtedly cause considerable numbers of gas staffs to avoid the use of public transport for short distances and such action, if general, would nullify the effect of the proposed fare increases as a quarter of the total income of the London Transport Executive comes from the minimum fare.

If the increases were granted and gas staffs found it impossible to avoid the use of transport, then undoubtedly the British Gas Staff Association would be faced with still further demands for salary increases to be negotiated or at least for an increase in the present London weighting of £30.

HOME SERVICE ADVISERS AT BIRMINGHAM

The above photograph was taken on the occasion of a visit of West Midlands Gas Board home service advisers to the Birmingham production centre of Radiation Ltd. They were entertained at lunch by the directors and officials of the company and afterwards witnessed a cookery demonstration by the staff of the Radiation Research Kitchen. The party included the area home service adviser, Miss O. L. Humphries, who is also the chairman of the Women's Gas Federation, and her deputy, Miss D. M. Roy, and Mrs. Eileen Murphy. In the photograph, left to right: Mr. J. Ivan Yates and Mr. F. A. Hooper (Directors of Radiation Ltd.), Mr. J. T. Rees, Mr. A. V. Horsfall.

Price Increase Protest

According to a report in the *Liverpool Daily Post*, local bakers have protested to the North Western Gas Board about the increase in the price of gas. One bakery reports meter charges increased from 14s. 3d. to £2 7s. and gas charges from £94 14s. 8d. to £125 3s. 7d. The Gas Board has been told that the Ministry of Food controls the price of bakers' products, and it is not possible for them to pass on any part of the increased gas charges by way of price adjustment in bread or confectionery.

The Board has been asked to enquire if consideration could be given to a special tariff for bread bakers. If the reply is not considered satisfactory Liverpool's bakers intend to take their complaint to the Consultative Council.

Talks at Torquay

Miss M. A. Lovell Burgess, Lectures Officer to the Gas Council, recently paid a visit to the Torquay Sub-Division of the South Western Gas Board, at the invitation of Mr. J. W. Denton, Sub-Divisional Manager.

A series of lectures arranged on November 20, 21, and 22 was given to two girls' schools, a Soroptimist Club, the Women's Section of the British Legion and various Towns Women's Guilds and Women's Institutes. The organisations were given a choice of certain lectures and those actually chosen included 'Gas and the Treasure in Coal,' 'Modernising the Home' and 'Modern Home Making.'

The talks promoted an extremely high standard of discussion.

RESEARCH ORGANISATION—*(Concluded from page 605)*

I think I should sound just one word of warning however. It will not be the intention of the Gas Council to produce reports unless there is something definite to report, either of progress made or of difficulties that have not been surmounted. Too much of the time of research workers can easily be taken up by their being asked to produce annual reports, reports of some length and detail being expected. This undoubtedly can have the effect of taking them off more important work in the laboratory.

I have referred to the use which it is hoped to make of the autumn research meeting of the Institution of Gas Engineers for the dissemination of the results of the research work carried out; this event, however, only takes place annually. While this may be satisfactory to the industry generally, it is felt that those engaged on scientific and technical work should have opportunities of considering and discussing the progress of the work at more frequent intervals. In order to provide for this it is the intention of the Research Committee of the Gas Council to establish a Research Liaison Committee, consisting of the Livesey Professor, the directors of the Gas Council's Research Stations, and a suitable Scientific or Technical Officer to be nominated by each area Board. The function of this Liaison Committee will be to keep each area board closely in touch with the progress of research being carried out and to keep the directors of research informed of problems arising in the industry. This Liaison Committee will have no administrative functions but will meet solely to discuss research problems. It is hoped that through this Liaison Committee a much keener interest will be stimulated in the research work being carried out and also that the directors themselves will thereby be kept more closely in touch with the problems arising in the gas industry.

I think I can most appropriately close this short statement by repeating what Professor E. N. da C. Andrade, D.SC., LL.D., F.R.S., said at the President's Luncheon held on May 29 last when he quoted a sentence of Faraday's in which he said that the three necessary steps in useful research are (1) begin it, (2) end it, and (3) publish it. With the addition of a fourth step—namely: (4) Apply it, the policy of the Gas Council would be aptly summed up.

A Hearth Roaster pyrites-burning sulphuric acid plant has recently been started up by Simon Carves, Ltd., at the Knottingley works of Synthetic Chemicals, Ltd. The company has also recently started up a sulphuric acid concentration plant at Grangemouth for British Petroleum Chemicals, Ltd., and a sulphur-recovery plant at Stanlow for Shell.

The Blyth Division of the Northern Gas Board is to have a new carbonising plant on the site of the present Spittal gasworks at Berwick. The cost will be about £75,000 and the contractors are Gas Chambers and Coke Ovens, Ltd. The present gas production at Spittal is 350,000 cu.ft. daily and with the new plant, which will be ready in 1953, output will rise to about 600,000 cu.ft.

Of the 125 Houses on one of the Feltham U.D.C. estates 121 have been supplied with gas cookers by the North Thames Gas Board. The 'London' cooker is largely installed on such estates, and the Chairman of the Council (Councillor P. C. McNally, J.P.) showed much interest in one of these when he officially 'opened' the thousandth post-war house to be completed by the Council.

The British Standard Test Code for Carburetted Water Gas Plant (B.S. 1784: 1951) applies to the manufacture of carburetted water gas in cyclicly operated plant and contains provisions for the experimental determination of the yields and quantities of the gas made, together with explanations of how these should be measured, but excludes reference to data which are not necessary to a general evaluation of the behaviour of a given plant. Notes on guarantee tests are included in an appendix. Copies may be obtained from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1, price 7s. 6d.

News in Brief

Sulphur Producers in the U.S.A. have told the National Production Authority that their output in 1952 will probably not exceed 5 mill. tons. The current annual rate of output, based on the first ten months' figures, is 5.3 mill. tons.

The Business Efficiency Exhibition is to be held four months earlier next year. It will open at Bingley Hall, Birmingham, on February 19, 1952, for ten days. Organisers are the Office Appliance and Business Equipment Trades' Association, 25, Haymarket, London, S.W.1.

Mock Football Matches between a men's fancy-dress team and an all-girl team from the Strathendry factory of Thomas De La Rue & Co., Ltd., have raised £100 for Leslie (Fifeshire) Old Folks Committee and the R.A.F. Benevolent Fund. The matches have proved so popular that requests have been received for repeated engagements in several parts of Fifeshire.

A Symposium on the Corrosion of Buried Metals, organised by the Iron and Steel Institute in conjunction with the British Iron and Steel Research Association and the Corrosion Group of the Society of Chemical Industry, will be held in the lecture theatre of the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2, on Wednesday, December 12. Sir Charles Goodeve, F.R.S. (Director of the B.I.S.R.) will preside. The sessions will begin at 10 a.m. and 2.30 p.m., and will be open to all interested.

The Institution of Gas Engineers announces the publication in 'grey book' form of Communication No. 387/183, being the paper on 'Horizontal Retorts' by J. E. Davis and C. Stott, presented and discussed at the 88th annual general meeting last May. The price is 2s. 6d. per copy, post free.

A French Engineering Firm has recently patented an agitated vessel that can be used for the steam distillation in vacuum of liquids containing heavy suspended matter. The agitating gear is of the planet type and the vertical shaft carrying the agitator blades is hollow to allow of the passage of steam to the bottom of the vessel.

Drakes, Ltd.—A sports quiz was held on November 21 in the canteen of Drakes, Ltd., Halifax, in which the quizmaster was R. Crowther, Sports Editor of the *Yorkshire Evening News*. The team comprised Bruce Woodcock, former British Empire and European Boxing Champion; and Tom Holley, formerly Captain of Leeds United. A vote of thanks was proposed by Mr. A. Stott, Maintenance Engineer, which was responded to by Mr. Crowther.

A Series of Four Lectures to personnel of the Sheffield and Rotherham Division of the East Midlands Gas Board has just been completed by Mr. J. C. Thomas, Technical Representative of Main Water Heaters, Ltd. Lectures were given at Doncaster, Barnsley, Worksop and Rotherham to audiences comprising fitters and service personnel. Mr. Thomas, with the aid of sectional models, explained in detail the construction, installation, and maintenance of the full range of 'Main' water heaters, instantaneous, storage and the G.L.C. circulator, and dealt with a number of technical questions from his audiences.

Power-Gas Canada, Ltd.

THE Power-Gas Corporation, Ltd., of Stockton-on-Tees, England, have announced the formation of a Canadian subsidiary, Power-Gas Canada, Ltd., which will have its headquarters in Montreal, at 660, St. Catherine Street West.

The Power-Gas Corporation, which has this year celebrated its golden jubilee, has had extensive experience throughout the world in the design and construction of a wide variety of plant for the production and processing of gases, not only for the manufactured gas industry, but also for other industrial purposes and for chemical synthesis.

The affairs of the Canadian company are being managed by Mr. G. M. Horner, who received his training in chemistry at the University of London and who is also an Associate of the Royal Institute of Chemistry and an Associate Member of the Institute of Fuel in Great Britain. He has been with the parent company since leaving the forces and has been concerned with a number of gas plant installations in several parts of the world.

The old association between Power-Gas and the John Inglis Co., Ltd., of Toronto, is to be closely maintained.

Saving Fuel

Importance of Insulation

MR. A. C. HAZEL, Managing Director of Hurseal, Ltd., in an address to the Portsmouth and District Ironmongers' Assistants' Association, pointed out that the efficiency of smokeless fuel grates was not particularly high if bituminous coal was used. He said the answer must be to increase production of smokeless fuels such as coke and Coalite, to satisfy the enormous demand created as a result of the installation of tens of thousands of these grates in recent months.

Mr. Hazel drew attention to the advantages of oil-filled gas radiators, which acted not only as convectors, but also had a heat carry-over. This meant that the radiator was, in fact, emitting warmth for quite a time after the gas had been turned off. These particular radiators, being totally enclosed, were perfectly safe, and could be used in bedrooms.

Later, Mr. Hazel spoke about domestic boilers burning smokeless fuel, and pointed out that his own Company had produced a domestic coke boiler having an efficiency of 76%. This boiler had a deep ashpan, which only required emptying once a week in winter, and once a fortnight in summer, when it was used for hot water supply only.

One field which was not being sufficiently covered at the present time was insulation. Undoubtedly, much fuel could be saved if housewives could be educated to the real need for insulating their hot water tanks and cylinders. Many housewives were under the impression that it was necessary to leave the tanks unlagged to keep the airing cupboard warm. In fact, the heat emitted from a few feet of 1 in. hot water pipe was adequate for the average airing cupboard. It was possible to insulate a small cylinder for as little as £2 14s.

In Mr. Hazel's view, everyone connected with the sale of heating equipment, whether gas, electricity, paraffin, or solid fuel, should also sell insulation material. It was in the national interest, as well as in the interest of each fuel producing industry.

Mains to Make Refrigerators

AN important new development in the production of refrigerators is indicated by the announcement by Glover and Main, Ltd., of the formation and registration of a new subsidiary company, Main Refrigeration, Ltd., with an authorised capital of £100,000. The new company is to produce an absorption-type refrigerator for operation by town gas, butane gas, electricity, or kerosene, and may at a later stage develop air conditioning equipment.

From within the Group's existing factory resources it is hoped to commence production and delivery of a domestic refrigerator during the latter part of 1952, although production is bound to be governed at first by the material supply position. We understand that at the outset the appliances will be made at Edmonton, but future plans include the building of a new and separate factory for refrigerator production. The largest output for the home market will be gas-operated appliances.

The Main refrigerator is to be manufactured under Swedish and British patents, held on unrestricted licences for the exclusive manufacture, use, and sale not only in the United Kingdom but also in Canada, the United States, South Africa, Australia, New Zealand, and other colonies and dominions of the American, African, and Australasian continents and parts of Asia.

Refrigerators of the type to be produced in Britain have been marketed successfully in Sweden. Main Refrigeration, Ltd., will be working in close collaboration with other licensees of the Swedish patents who will be marketing similar refrigerators on the Continent. These licensees have formed an alliance to provide the medium for the continual interchange of ideas on development and marketing which should materially benefit the progress of the new project.

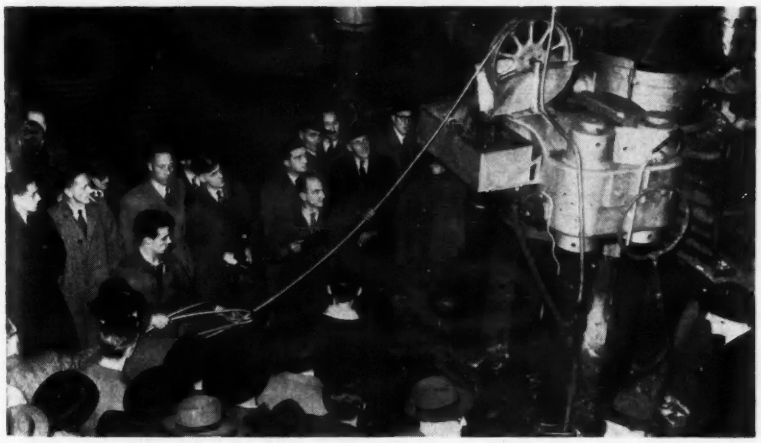
In view of this country's pressing need to export, particular attention is to be given to the manufacture of the Main refrigerator for this market, especially to dollar areas, where investigation has shown that there is a large potential demand and excellent possibilities for marketing.

The first Directors appointed to the Board of Main Refrigeration, Ltd., are Mr. P. D. M. Aird (Deputy Chairman, Glover and Main, Ltd.), Mr. F. Dunn (Director, Fisher and Ludlow, Ltd.), and Mr. C. Marley (Joint Managing Director, R. and A. Main, Ltd.). This Board will be expanded as necessary for the development of the project.

Shipley Compensation

Shipley Council has decided to utilise the £13,350 received under the Gas and Electricity (Severance) Compensation Regulations to set up three funds—a capital fund, an insurance fund, and a renewal and repairs fund—and to transfer to these funds £7,000, £2,500 and £3,850 respectively from the compensation money. The purpose of the insurance fund is to make good all losses, damages, costs and expenses in respect of fire damage to houses or similar small properties erected or acquired by the Council, also fidelity guarantees in respect of council employees, glass insurance, and risks in regard to the Chairman's chain of office. The object of the renewal and repairs fund is to defray the cost of repairing, maintaining, and renewing mechanical plant and vehicles under the control of the Public Works Committee as well as light plant and tools used in the various council departments.

N.W. SALESMEN VISIT LEAD WORKS



The annual general meeting of the North Western Gas Board's Salesmen's Circle which was held at Bolton on November 7, was preceded by a visit to the works of R. E. Roberts & Son, Ltd., lead manufacturers, Windley Street, Bolton. The members were received by the Managing Director, Mr. T. Gledhill, and were later conducted round the extensive works where they were able to see lead pipe being manufactured. After completing a highly informative tour of inspection, the party were entertained at tea. Our photograph shows members watching lead piping being drawn.

Cooking Demonstrations at Guernsey Eisteddfod

COOKING by gas took pride of place in Guernsey when a series of twelve cookery lectures was given by Miss Main (Diplomée Cordon Bleu (Paris), M.C.A.), of R. & A. Main, Ltd., and demonstrated on a Main 177-16D cooker. The lectures, given in the demonstration room of the Guernsey Gas Light Company's showroom, comprised afternoon and evening sessions daily during the week October 29 to November 3, and embraced a representative selection of dishes, ranging from a simple dinner making full use of the oven, to more elaborate items such as fish soufflé and Christmas cake decoration.

The first lecture in the series was opened by Lady Sherwill, who was introduced by Mr. Quertier Le Pelley, Chairman of the Guernsey Gas Light Company. Others at this opening lecture included Mr. C. B. Blampied (Vice-Chairman), Mr. H. W. Crousay, Deputy C. A. Collas and Mr. W. N. Langlois (Directors), and Mr. R. G. Luxon (Engineer and Manager) of the Company.

Throughout the week nearly a thousand interested and appreciative folk attended the demonstrations, and the questions asked at the conclusion of each session denoted the interest aroused. Mr. Luxon reported that the sales of Main cookers during the demonstrations were particularly good, and that many other sales were pending, merely awaiting final decision on size.

Under the auspices of the Guernsey Eisteddfod a cookery competition was held, and the entries in the gas cooking section were judged by Miss Main. There were 50 entries in this section, and each consisted of a cherry cake and a batch of scones.

At the last demonstration of the series, M. R. G. Luxon, on behalf of the directors of the Guernsey Gas Light Company, presented Miss Main with a travelling clock which, said Mr. Luxon, was a small token of their appreciation of the excellent way in which she had conducted the demonstrations and of her services in adjudicating in the gas cooking competition. Mr. Luxon said he had heard nothing but praise for the way in which she had judged the competition. He felt sure her decisions and remarks would prove of great value, especially to the younger competitors.

Miss Main, in reply, thanked Mr. Luxon and through him the people of Guernsey for providing such delightfully appreciative audiences.

C. C. Wakefield & Co., Ltd., announce that their industrial lubrication service is now organised on regional lines under the direction of regional sales managers. Mr. C. W. Page has been appointed Sales Manager of the Eastern Region in succession to Mr. B. S. Davis, who has resigned. Mr. Page joins Messrs. J. E. S. Elwell and D. S. Kirkpatrick, Northern and Western Regional Sales Managers respectively.

IN PARLIAMENT

Scarcroft: Government Enquiry

Further Reflections on the Coke Shortage

THAT the public at large, and through them their elected representatives in Parliament, were seriously perturbed over the B.E.A. Scarcroft case was evident from a number of questions in the Commons on November 26.

Under 'matters arising' came a question from Wing-Cmdr. E. E. BULLUS (Wembley, North) asking the Minister of Fuel and Power if he would introduce legislation to surcharge members of nationalised boards in respect of fines imposed on such boards in a corporate capacity. It was fantastic, he said, that a highly paid official appointed to watch public expenditure should have his fine paid for him by the public against whom he has offended.

Mr. GEOFREY LLOYD did not think this was an accurate description of what took place, and pointed out that the Court had discretion, as in this case, to impose a sentence of imprisonment on individuals in their individual capacity. He did not consider further legislation necessary. Nor was he prepared to pronounce at short notice on a riddle by Mr. R. T. PAGET (Northampton), who asked, in effect: 'What is the difference between a nationalised director and a private enterprise director?' We trust the answer to this, when it is forthcoming, will not be so unsatisfactory as the answer to the famous riddle in Alice in Wonderland.

On December 3 Mr. Geoffrey Lloyd explained to the Commons that when he saw the part-time members of the Yorkshire Electricity Board on November 28 they brought to his notice information which showed that the officer of the Minister who was instructed to obtain and check the information from the Board might have been aware of the inaccuracy of the answer. Mr. Geoffrey Lloyd added that he had instituted immediate investigations into the matter. In answer to a question, he said he would report to the House the result of the enquiries as soon as they were complete.

Coke Stocks

In answer to Mr. W. R. BROWN (Esher), the Minister said that stocks of coke at the end of October in the years 1950 and 1951 respectively were as follows: At coke ovens, 253,000 and 82,000 tons; at gasworks, 931,000 and 395,000 tons; in merchants' yards, 143,000 and 93,000 tons. Mr. Lloyd gave an assurance that he would do all he could to expedite the carbonisation programme. Can the gas industry take heart from this?

Fuel from the Local Shop

Do hardware shops sell Coalite? They don't down our way; but we suppose they must elsewhere since Mr. G. C. HUTCHINSON (Ilford, North) asked the Minister of Fuel and Power whether, in view of the fact that Coalite is now part

'Will hardware and other shops continue to sell Coalite?'

of the domestic allocation, hardware and other shops will continue to be allowed to sell it in unrestricted quantities.

We gather from the Parliamentary Secretary's answer that the local hardware shop will enjoy the same privileges as the gasworks. It may continue to sell fuel in the shape of Coalite in 28 lb. lots as heretofore.

Ownership of Coke Ovens

Mr. DAVID GRIFFITHS (Rother Valley) evinced interest in the ownership of coke ovens and by-product plants, and obtained from the Minister the information that there are 76 coke oven plants in operation under public ownership and nine under private enterprise. With the exception of two of the former, all have by-product plants.

The public must by this time be aware of the fact that there is a shortage of coke, but the subject took on a new complexion when Mr. G. R. MITCHISON (Kettering) seemed worried that no one knew where coke burning apparatus was installed—neither Ministry nor gas board. In other words, people had been encouraged to put in special equipment with the object of saving fuel, and steps should be taken to make special provision for those who could not use coal in their apparatus.

Mr. LLOYD admitted that no arrangements had been made to ascertain where such special stoves had been installed; but we feel that Mr. Mitchison and the Minister can rest assured that the British public may be relied upon to make known in no uncertain tones its possession of coke-burning appliances just as soon as it fails to get enough coke to burn in it—so perhaps we may be spared further form-filling on this account.

Underground Gasification

This subject is apparently still sufficiently novel to excite the curiosity of hon. Members, and a question from Mr. J. R. ROBINSON (Blackpool, South) drew from the Minister of Fuel and Power the scientific view that gas from underground gasification of coal in this country could be used for driving gas turbines and for generating steam. It is expected that two coal seams at Bayton, Worcestershire, will be ignited early next year, but Mr. Lloyd could not forecast how long this phase of the experiment will last.

Publications Received

We acknowledge with thanks the receipt of trade and allied publications, house organs, etc.

Alexander Duckham & Co., Ltd.—'*Links*,' a magazine issued in the interests of users of the firm's lubricants.

British Constructional Steel Association.—Technical Brochure No. 3, 'The Application of the Plaster Theory to the Design of Mild Steel Beams and Rigid Frames,' by F. A. Partridge, B.SC.(ENG.).

Crossley Brothers, Ltd.—'*Crossley Chronicle*,' a periodical review of matters concerning the firm's marine, locomotive, and land type oil engines; also gas engines and gas producing plant.

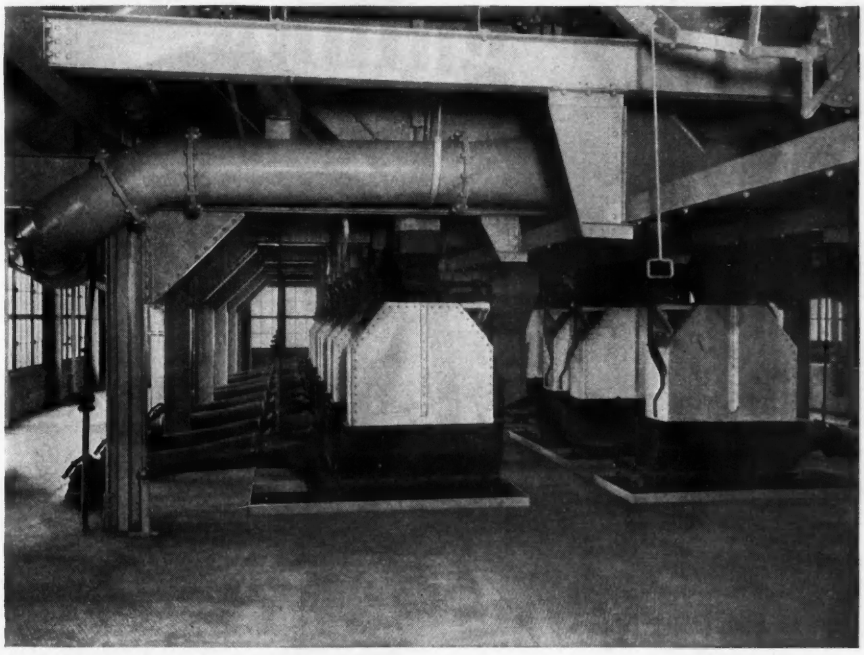
Purchasing Officers' Association.—'The Futures Markets,' by J. F. Blitz, M.A., reprinted from editions of the '*Purchasing Journal*.'

Council of Industrial Design.—The 6th Annual Report, for 1950-51.

Copper Development Association.—'Copper: Its Ores, Mining, and Extraction'—a booklet for schools issued free to all those interested.

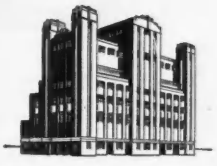
Australian Gas Light Company.—'*Service*,' the Company's house journal, which covers many phases of the undertaking's current activities.

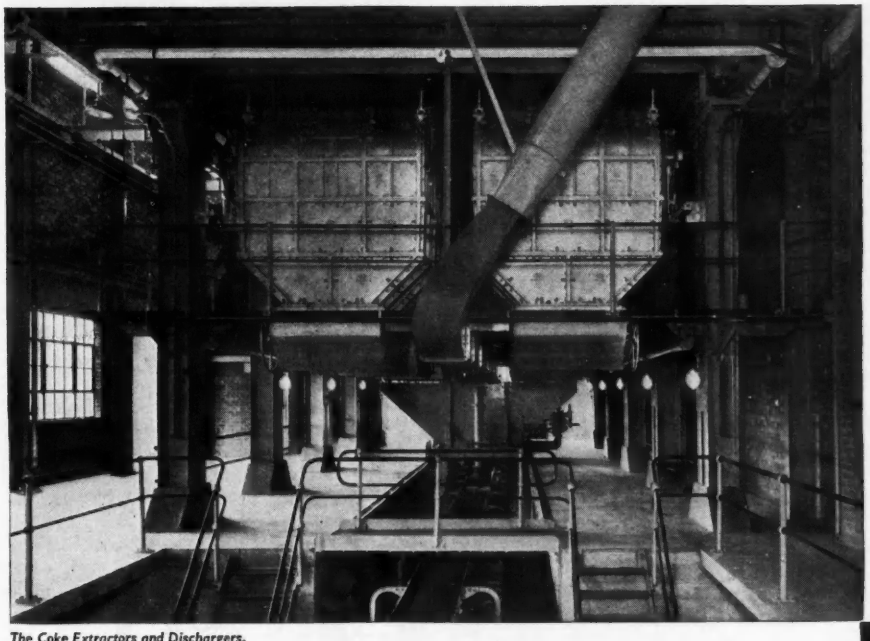
Automotive Products Co., Ltd.—'*Precision*,' a magazine devoted to the application of Lockheed hydraulic brakes and to various other subjects related to the motor car industry.



The Top Charging Platform.

HIGH THERMAL EFFICIENCY PLUS GOOD WORKING CONDITIONS





The Coke Extractors and Dischargers.

CONTINUOUS VERTICAL RETORTS AT THE CHELMSFORD STATION OF THE EASTERN GAS BOARD

THE

WOODALL - DUCKHAM

VERTICAL RETORT & OVEN CONSTRUCTION COMPANY (1920) LTD.

W-D

WOODALL - DUCKHAM HOUSE, 63-77, BROMPTON ROAD, LONDON, S.W.3.
Telegrams: Retortical (Southkens) London.
Telephone: KENsington 6355 (10 lines).

D

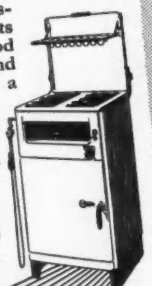
28th November 1951

Most precious possession

Three wise men, being once asked what was life's most precious possession, replied severally: Good Health: A True Friend: A Loving Wife.

Asked the same question today, they would reply in unison: A NEW WORLD 1840 GAS COOKER. With or without benefit of philosophers, the household which has one of these incomparable cookers enjoys all three most precious possessions. For good health waits upon good cooking; a good cooker is a true friend; and a happy cook makes a loving wife.

See the NEW WORLD 1840 Gas Cooker at your nearest Gas Showrooms and find out for yourself why more than two million loving wives say:



...it's a NEW WORLD PRODUCT OF Radiation Ltd for me!

31st October 1951

"A thing of beauty is a constant joy"

So wrote Keats originally, with more accuracy than in his later version about "a joy for ever". There was no gas cooker in the poet's Hampstead kitchen. If there had been, it is doubtful—industrial design of the period being what it was—whether it would have inspired him with a sentiment so admirable.

Today—in an æsthetically more self-conscious, if not more sensitive age—there may often be more poetry in the lines of a kitchen appliance than there is in the Third Programme.

The NEW WORLD 1840 Gas Cooker doesn't write sonnets, but does produce meals which may be lyrical. That it is a thing of beauty you may see in the picture on the right. That it is a constant joy more than two million users of NEW WORLD Gas Cookers will testify.

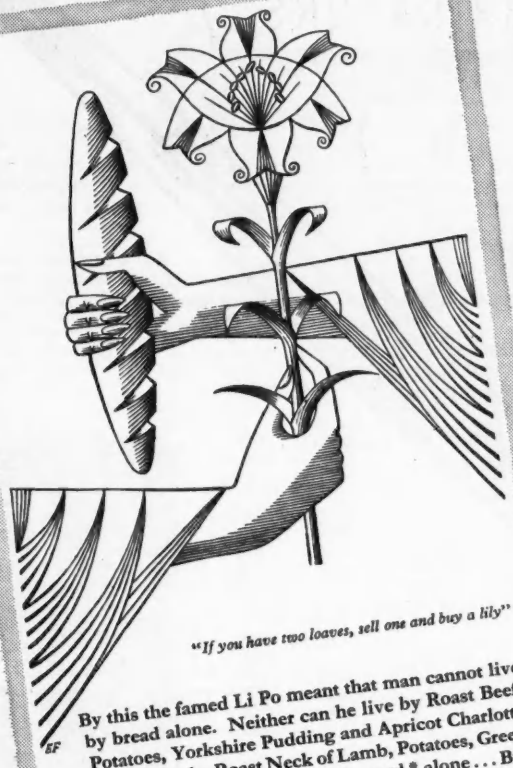
We suggest that you see this distinguished appliance in your nearest Gas Showrooms.

...it's a NEW WORLD PRODUCT OF Radiation Ltd for me!

NEW WORLD NEW WORLD NEW WORLD

adding PUNCH to New World advertising

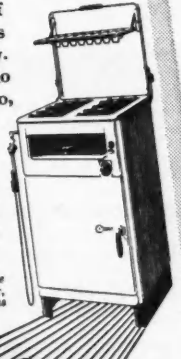
14th November 1951



"If you have two loaves, sell one and buy a lily"

By this the famed Li Po meant that man cannot live by bread alone. Neither can he live by Roast Beef, Potatoes, Yorkshire Pudding and Apricot Charlotte alone; nor by Roast Neck of Lamb, Potatoes, Green Peas, Apple Pie and Baked Custard * alone . . . But with the assistance of the Ministry of Food and a NEW WORLD 1840 Gas Cooker, he can have a good try. We can offer you no loaves, no lilies, no roast beef . . . and, no, not even any neck of lamb. We can and do offer the suggestion that you go quickly to your nearest Gas Showrooms and there ask to see these incomparable NEW WORLD 1840 Gas Cookers.

* *From "Whole Dinner Menus", page 228 et seq of the Radiation Cookery Book, 40th Edition. Price 5/- nett at all Gas Showrooms.*



. . . it's a NEW WORLD PRODUCT OF Radiation Ltd *for me!*

These advertisements for the NEW WORLD No. 1840 Gas Cooker are appearing regularly in PUNCH

RADIATION GROUP SALES, LTD., Head Office & Showrooms: 7, Stratford Place, London, W.1. Tel. MAYfair 6462

NEW WORLD NEW WORLD NEW WORLD

R. H. NEAL AND CO. LTD.,

FIT WAKEFIELD LUBRICATORS

TO THEIR NEW 10 TON

MOBILE CRANES +

"A fully mobile crane of this capacity is no mean achievement" — that is what "Mine & Quarry Engineering" said about the new Neal Type 'R' crane. Because it is designed to lift 10 tons *without using jacks or outriggers* and to travel with full load under its own power, the most efficient type of force-feed lubricating equipment was installed — the Wakefield 2G Mechanical Grease Lubricator.

WAKEFIELD
MECHANICAL LUBRICATORS

C. C. WAKEFIELD AND COMPANY LIMITED • LONDON • W.1

CONSULTATIVE COUNCILS IN SESSION

North Thames Price Increase

Heavy Operating Costs

THE Chairman of the Board (Mr. Michael Milne-Watson), accompanied by the Deputy Chairman and the Chief Accountant, attended the meeting of the North Thames Gas Consultative Council at the Westminster City Hall on November 29 (presided over by Councillor Edwin Bayliss) to explain the necessity for another increase in the price of gas in the near future.

It was with regret, said Mr. Milne-Watson, that the Board had to record further serious increases in costs which had arisen since the revision of gas prices last summer. He gave the following figures to indicate in terms of annual amounts, the estimated increases in costs as compared with the rates prevailing in June, 1951:

	£
Coal, oil, and freight	407,000
Wages and salaries	550,000
General costs, including capital charges, maintenance of buildings, roads and plant, stores consumed, and meter repairs	489,000
	£1,446,000

During the last year there had been increased efficiency of operation, and economies had been effected; but these were quite outweighed by the present inflationary trend. The Board had therefore reluctantly decided to increase the price of gas throughout the area by 0.9d. per therm, making the flat rate price 18.5d. per therm. All prices under special tariffs would also be increased by a similar amount.

It had been intended, said Mr. Milne-Watson, that the increase should be operative from January 1, 1952, but it was now thought desirable to leave the date open; and a further announcement would be made when the Board had been able to consider the situation resulting from the proposed increase in the wages of mineworkers. Whether they would be asked to bear their part in that increase or not was, of course, still undecided. The decision might come at any moment, and it would have been absurdly optimistic if he had ignored the possibility in the statement he had just made.

Further Details

When dealing with figures as colossal as these it was important to look into the details. The first two items (coal, oil and freight and wages and salaries) would be readily understood. The third heading might seem a little broad, and in order to give the members of the Council some explanation he would quote additional figures related to the position as they found it to-day. Capital costs—*i.e.*, expenditure on new works and plant, repairs, etc.—had between April, 1950, and October, 1951, increased by no less than 40%. Again, only since last June the price of steel had risen by 20%; cast iron by 5%; lead by 10%; and brass by 15%. He was sorry to have to make so gloomy a statement, but he was sure there was no need to elaborate it further.

Mr. Bayliss pointed out that the proposed increase would be re-submitted to the Council in due course, after the effect of the increased price of coal had been considered. At that stage the Council would be at liberty to discuss the matter fully.

Some discussion did, however, take place at this stage, and several members pressed for more detailed figures to be submitted when the final proposal was placed before them. In reply to the suggestion that much of the increased costs represented capital expenditure and should therefore be spread over a period of years, Mr. Milne-Watson said that apart from a small amount of expenditure under the third heading, all the increases were chargeable against revenue account, being part of the Board's day-to-day operations. As he had already pointed out, capital charges were increased by 40%.

Little Time for Study

In the course of further discussion, it was complained that the members of the Council had received the proposals less than 24 hours prior to that meeting and had consequently had little opportunity of studying them. It was requested that the final proposals be circulated to members so as to allow of sufficient time for study. It was also asked in what directions economies had been effected by the Board with the object of offsetting the increased costs to some extent. It would be easier to judge the position if they could have some data to show that gas was being produced more efficiently.

Mr. Milne-Watson observed that in the process of gas manufacture a minute improvement of, say, 0.1% in efficiency was regarded by a gas engineer as very good. But then one got increased costs which completely swamped such small savings. Whether or not they would ever catch up with rising costs he could not say. At the moment the trend was the other way. Possibly new discoveries would enable them to catch up. He was not qualified to look into the future, but he could say that all their staff were trying to make gas more cheaply. It was going to be a long term policy, however, when they had to catch up with such enormous increases.

Whereas prior to nationalisation gas undertakings used to have a carry-forward which could on occasion serve as a 'cushion' against increased expenditure the following year, to-day they tended to cut that out and aimed to balance as nearly as possible their income and their outgoings each year. Again, their's was an industry which relied to a great extent upon weather conditions and temperature with their uncertain affect upon revenue. If they knew in advance how much gas they were going to sell they could probably increase their efficiency of production.

In bringing the discussion to a close the Chairman invited members to send to the Secretary in writing requests for any specific information which they would like to accompany the final statement on the price increase.

Police Protection for Forcible Entries

The Council considered the implications of the Eastern Gas Board's 'forcible entry' appeal case and resolved to ask the Minister to consider an amendment to the Gas Act, 1948, whereby both gas board official and consumer would be protected at the time of a forcible entry by the presence of a police officer. It was also suggested that they ascertain what the North Thames Gas Board's procedure would be in such circumstances.

Arising from the question raised at the previous meeting on the abandonment of meter cards, the Secretary read a letter from the Board stating that the general issue of meter cards was stopped some 16 years ago over the greater part of the area, as a result of which a substantial saving in working costs had been effected. The new form of account, if studied in conjunction with previous accounts, would give all the information provided by a meter card. Nevertheless, a card would be provided where a consumer specially asked for it.

North Thames Pensioners' Party

The 'first ever' pensioners' party organised by the Bromley-by-Bow Sports Club for pensioners from the North Thames Gas Board's Bromley works took place recently in the new works canteen. More than 80 pensioners, accompanied by their wives, sat down to dinner, which was followed by an evening's entertainment.

A similar function was arranged a week or two earlier at the Board's Nine Elms works. The oldest pensioner present on this occasion was Mr. Nash, aged 92, who retired some 30 years ago.

Seventh Branch Conference of

Women's Gas Federation

THE Seventh Branch Conference of the Women's Gas Federation was held on November 5 and 6 at Gas Industry House. Delegates consisting of officers and members from over forty branches were welcomed by Miss Halpin (the President), who opened the conference. Miss Humphries (Chairman), Dame Vera Laughton Mathews, and Miss Ellington Wright were present on the platform.

Miss Halpin said that the branches were the life-blood of the Federation which, almost daily, was increasing in membership. They consisted of a cross-section of the community and were the essence of the organisation. The value of a conference was the means whereby members could meet together and give their opinions on the development of the organisation and obtain others from headquarters, thus providing a valuable two-way flow.

Over the last year, a thing of real moment was the change of name, showing the world more clearly of what the organisation consisted—a federation of branches.

The second important achievement was Festival Fare, the national cookery competition. The fact that there were some 40,000 entries was due in a large measure to the work of the branches, making the competitions in the various gas board areas so attractive that people were anxious to compete, and in many cases became members of the Federation. This had been a most successful piece of work and one to be followed up in the near future. Miss Halpin congratulated Greenock branch on winning the Membership Cup, and said that she expected a large number of branches would challenge them the next year.

Strenuous Programme

Miss Halpin said that all the branches who had been fortunate enough to have Dame Vera Laughton Mathews to speak at their meetings were most grateful for her interest and enthusiasm in their work. It was of tremendous value to the federation to have at headquarters someone of her wisdom and experience as adviser, philosopher, and friend. Miss Halpin told delegates that there was in front of them a very strenuous programme. In the months to come the spotlight would be on fuel economy, and the branches could play a part of national importance in explaining the situation and in helping the housewife in her problems. Members needing special advice in the matter could always refer to headquarters.

Summing up, Miss Halpin said that extension of the work of the Federation could only be brought about by extension of the branches. Headquarters would greatly value the co-operation of members willing to take a share in the development of new branches.

The speaker at the afternoon session, Miss Margaret Reekie, of British Nylon Spinners, who said that nylon was the 'most glamorous by-product of gas' and was the first manufactured textile fibre. In relation to the national economy nylon was the only textile of which all the raw materials were available in this country, and earned money for Britain without the cost of importing raw materials. Over 90 mill. pairs of stockings were made in one year.

On the second day, visits were made in the morning, by courtesy of Radiation Limited, to the two houses at Stanmore which had been specially designed to demonstrate whole-house heating methods; to the Hotel School, Westminster Technical College; and to the Royal Festival Hall, Southbank. A buffet luncheon was arranged for the delegates at Gas Industry House.

Special General Meeting

In the afternoon, with Miss Humphries in the chair, and supported by Dame Vera Laughton Mathews, Miss Ellington Wright, Miss Pidsley, Miss Godby and Miss Flack, a Special General Meeting passed a resolution recommended by the Executive Committee—an alteration to Rule X in the constitution concerning subscriptions, to read as follows:—

1. The standard annual subscription payable by members shall be 2s. 6d., of which 1s. 6d. shall be paid to the Secretary of the Federation as a capitation fee and shall cover the supply of the Federation's magazine *Commentary*.
2. The financial year for the purpose of the accounts shall run from January 1 to December 31.
3. Subscriptions shall be payable on January 1 and capitation fees shall be remitted to reach Headquarters not later than March 1.

Miss Humphries described the preliminary arrangements made for the Federation's second residential conference to be held in Stratford-on-Avon next April. The dates suggested were April 22, 23 and 24 and the chairman drew attention to the fact that celebrations for Shakespeare's birthday on April 23 and a visit to a Shakespearian play at the Memorial Theatre would be additional attractions to the sessions being planned for the conference.

Domestic Fuel Problems

Mr. Leslie Hardern (Public Relations Officer, North Thames Gas Board) in an address on 'Solving Domestic Fuel Problems,' said that most English houses are 'terrible heat wasters' and few of those already in existence are properly insulated. An inexpensive method of keeping the warmed air from leaving the house was by laying between the rafters in the attic glass wool (or wool slag) 3 in. to 4 in. thick.

It was possible, though difficult, to over-insulate a room, but if that point were reached, fires would die down for lack of sufficient draught. Lovers of fresh air should bear in mind at a time of fuel shortage that according to the scientists the air in an English room is changed as many as twelve times an hour, although it is not necessary to good health for it to be changed more than three times.

In a house where there is gas, but no electricity, the housewife should be able to use gas for cooking all the year round. She should also use it for water heating and occasional room heating in the spring, summer, or early autumn. Her limited supplies of coal and coke should be used for heating rooms and, in the boiler, for hot water in the winter months only. A modern living room fire with a back boiler and preferably some convected heating to the bedrooms above will be economical.

Mr. Hardern ended by remarking that their main interest was to know how to keep warm, to do their cooking and to have sufficient hot water during the next few years of acute fuel shortage.

Liverpool Represents Gas Industry in First Aid Competition

THE Liverpool first aid team, which lately won the St. John Ambulance Association Trophy for the best team in the gas industry, represented the industry in the annual competitions for the Grand Prior's Trophy at the Central Hall, Westminster, on November 20. This is the highest competition of its kind. Competition was very formidable and the tests extremely severe, and Liverpool did well to achieve a seventh place.

The team test was to render first aid in fifteen minutes after a car had crashed into a lamp-post. The driver was found dazed in his seat, suffering from spinal injuries and had glass embedded in a damaged right arm and eye. He had to be carried into a nearby house.

The possible marks were 400 of which the winning team scored 317. Liverpool scored 211½ and are confident they can improve upon that next time. The team were: J. A. Clague (Captain); R. Woods; J. Bowness; A. Green; T. E. Taylor (reserve).

This team also won the St. John Ambulance First Aid Industry Trophy at Liverpool on November 17, when they scored 257 marks and beat the Liverpool City Police who were the holders.

Therm Conversion Device

A READY means of converting meter readings from cubic feet to therms without the necessity for mathematical calculation has been introduced by Smith Meters, Ltd.

This well-finished device is shown in the accompanying illustration (at half actual size). On the back are indicated the normal meter dials with an explanation of how to interpret them. Having arrived at the total number of cubic feet to be converted, the pointer at the bottom aperture on the front of the calculator is set against that figure. The other three apertures then give the appropriate reading in therms, for gas at three alternative calorific values—namely, 450, 475, and 500.

It is regrettably true that to the vast majority of consumers a therm 'doesn't mean a thing'—a fact which is all the more unfortunate at a time when everyone is being pressed to economise consumption by keeping an eye on his meter readings. Moreover, there are also many consumers who like to check their consumption with the gas board's account—more in the hope than the expectation that they can prove they have been overcharged. The distribution of these little calculators to such consumers might enhance goodwill.

From the viewpoint of the gas board's internal organisation the calculator also has several obvious applications. The calculator would help the gas salesman, who could use it to give an immediate conversion whenever the consumer asked

for it and, equally, translate the stated thermal outputs of gas consuming appliances into readily understandable terms.

The calculator is available on application to Smith Meters, Ltd., 186, Kennington Park Road, London, S.E.11.

Domestic Science Teachers Visit Gas Board

THE South Eastern Gas Board recently arranged an evening meeting at Old Kent Road for 120 members of the Association of Teachers of Domestic Subjects. The programme included a film, 'The Obedient Flame' and a lecture 'Your Cooker in the Laboratory,' by Mr. G. H. Fuidge (Chief Physicist of the Board). The lecture was illustrated by lantern slides showing full details of every test to which a cooker is subjected when it is received at the laboratory. There was a full and interesting discussion followed by an inspection of latest types of gas appliances.

The arrangements for the evening were made by Mrs. Mair Jones (Chief Home Service Adviser) who, in welcoming the guests, said home service advisers of the Board were keen to co-operate with teachers of domestic subjects, and would always be pleased to provide any information or any assistance they might require. The schoolgirls of today were the housewives of tomorrow, and it would be ideal if they could be trained to use modern gas appliances, similar to those which they would find in their future homes. The teachers trained the children until they left school, and through demonstrations, lectures and classes, the home service advisers endeavoured to carry on the good work

Penrith Developments

THE developments which are in progress at the Keswick works were described to Penrith Divisional Committee of the Northern Gas Board recently by Mr. A. Field, the Divisional General Manager.

Mr. Field stated that the Northern Gas Board sanctioned the complete mechanisation of the carbonising process at the Keswick works, which will include coal handling plant, retort charger and discharger, and coke grading and screening plant with overhead storage bunkers for loading into road vehicles. In addition, the retort house has been extended and provision made for a further setting of six retorts.

They were erecting new stores buildings, fitters' shops, weigh office and gas testing room, together with alterations to the existing showrooms in order to allow for the improved display of appliances.

At the present time work was progressing on the retort bench extensions. The end gable wall had been built and an additional chimney erected. The building of a further setting of retorts was proceeding. The foundations for the coal and coke handling plant had been started. Mr. Field added that the new stores building and work on the showroom were almost complete. When the scheme was finished it was expected that manufacturing costs would be reduced considerably.

Mr. Field told the Committee that further developments were also taking place at Kirby Stephen and Penrith.

NEW OIL DISTILLATION UNIT

MANCHESTER OIL REFINERY, LTD., at Trafford Park, Manchester, was founded in 1936. At that time the contention of the major oil companies was that refining should, for economic and strategic reasons, be carried out in the centres of crude oil production; this was also one of the tenets of the British Government's oil policy.

However, the management of this new independent company was convinced that advances in refining technique had made it possible to operate refineries economically 'on the doorsteps' of Britain's consuming industries. Such refineries would have great flexibility, both in the use of their charge stock and in the output of their products. In this way, and in this way only, oil users would obtain the specialised products they needed, and the oil refiner would be able to keep in step with technical developments in the engineering and other industries of this country.

The plant of Manchester Oil Refinery was brought into production in 1938. When war started, and Britain was cut off from its main sources of supply of lubricating oils, transformer oils, technical white oils, and other oil products, the value of a home based refinery became evident. Manchester Oil Refinery made a valuable contribution to the war effort by supplying industry as well as the defence services with these products.

To-day, a new expansion programme for Manchester Oil Refinery is being carried through in a changed climate. The policy of home refining has been adopted by the British Government and plans for a vast increase in Britain's refining capacity are materialising.

Last March, the Chairman of Manchested Oil Refinery, Ltd., Mr. H. Stuart Ebben, announced that the throughput of the refinery (which in 1950-51 had reached a figure of 115,000 tons per annum, compared with the wartime figure of approximately 70,000 tons fixed by the now defunct Petroleum Board) would be increased to 150,000 tons per annum. Details of the first step in this programme are now available; they reveal that construction work is already going ahead on a new 3,500 bbl./day atmospheric distillation unit.

The new unit, which will work in conjunction with the existing vacuum distillation unit, will consist mainly of a fractionating tower approximately 120 ft. high. This tower has the effect of separating, within fine limits, various fractions present in the crude oil. It will extend the existing ranges of M.O.R. products by producing white spirit and other petroleum solvents as well as petrol. An important consideration is that it will enable the refinery to use crude oil from the Middle East as well as from present sources in North and South America. The new expansion programme means more petroleum products for industry at the cost of less dollars for crude oil.

Gas Industry in France

—By ASHTON

Our Contributor underlines in the French Technical Press a selection of current developments in the gas industry across the Channel.

THE publication of Statistics for 1950 by the Economic Direction of Gaz de France was announced and analysed in the Editorial of *J. des Usines à Gaz* for September. It is interesting to note that only 95% of the whole of the country's gas output is controlled by the National Service and covered by these statistics.

At first sight, says the Editor, 1950 is characterised by a certain pause in the development of gas sales. The total volume of gas sold showed only a slight increase, though not negligible for, with the year 1946 as reference with index 100, the index has risen from 122 to 124 between 1949 and 1950. This increase might have been greater if the labour troubles of March, 1950, had not resulted in an appreciable loss of production. Yields per ton of coal carbonised were maintained at 17,940 cu.ft. of gas at the equivalent of 440 B.Th.U./cu.ft. saturated at 60°F. and 30 in. Hg. with 9.4 cwt. of coke available for sale.

The gross tonnage of coal carbonised shows a slight decrease, from index 119 to 116, but the quantity of petroleum products used in gas production continues to rise, attaining a new record of 59,559 tonnes. And while in 1947 these products were almost entirely represented by gas oil they comprise in 1950, 85% paraffinous distillates. The Editor again underlines the very decided tendency in France's gas industry to make more and more use of the derivatives of petroleum and in the direction of the lower grades of these. It is probable that heavy oils will soon make their appearance in the statistics, since several works are already equipped for the use of heavy oil for the enrichment of water gas while a first installation for the direct production of gas by oil cracking is under trial at Cahors. The purchase of propane for the use of small undertakings is also mentioned. Gas sales show a slowing-up of expansion in the domestic field with a continued rise in industrial and commercial consumptions. It is remarked that this is not surprising since the domestic field is 'less new' than the others though far from saturated. The statistics emphasise the importance of the propaganda already in hand for the development of uses of gas for cooking and for water heating. Commercial uses are steadily growing, especially in the large scale kitchen—sales to restaurants, hospitals and communal undertakings of all sorts reached a record in 1950.

New Installations

In the October issue the Editor comments on the report of Gaz de France on the work of modernisation and new equipment completed in the first quarter of 1951. New installations include coke ovens at Villeneuve-la-Garenne, retorts and producers at Marseilles, complete gasification at Vierzon, water gas at Toulon, propane enrichment at Loos, and retorts at Cherbourg. Eleven small producing stations have been shut down and their districts linked up with neighbouring larger works. There is a big programme of work under construction. A station for the distribution of pure propane has come into service at Gérardmer and one for aerated propane at Mormant; work is in progress for the substitution of aerated propane for coal gas in five other small works.

For the whole year 1951 the programme of work was limited to 14.5 milliards of francs while the needs are of the order of 24 milliards; the increasing costs of raw materials has increased the difficulties of financing these operations. The programme for 1952 submitted by Gaz de France to the Commissariat of Modernisation and Equipment envisages the expenditure of 26.5 milliards of francs, of which 18.6 are for work already authorised or of a recurring character and 6.5 for complementary or new operations. In the last category is 2.6 milliards for the construction of the feeder main which will carry gas in 1953 from the steelworks and collieries of the east to the Parisian region.

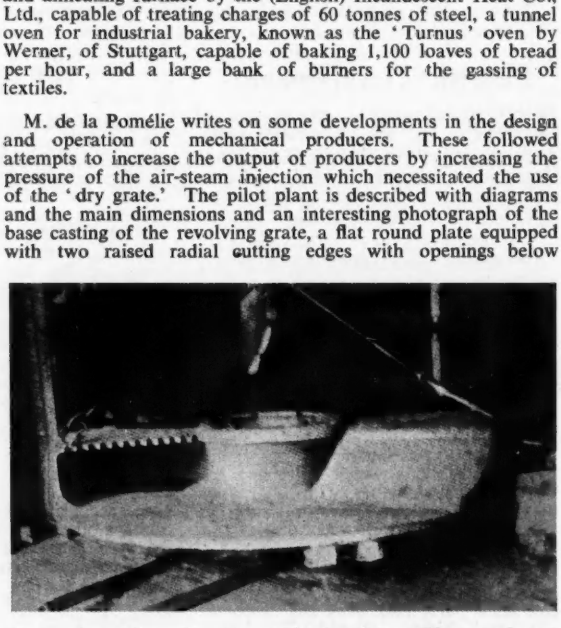
While on the subject of finance and production it is interesting to note (1) that the value of the gas index corresponding to the economic condition of the second quarter of 1951 was declared at 125 based on 100 for the third quarter of 1950. This index, which is applicable from August 1, 1951, is the figure by which the standard selling price of gas is now fixed. And (2) that gas lies second in the table of indices of industrial production for 1950, with petroleum 208, gas 174, rubber 173, electricity 160 and glass 150.

Études et Documentation

Under this heading (corresponding to our Technical Information), the two issues contain several papers of interest. M. Combet, Director-General of Gaz de France, returns to industrial architecture. His short article was prompted by a meeting of the Institute of Industrial Aesthetics devoted to the study of relations between electricity and aesthetics—the design of power stations and power lines. To attempt to present it in abstract would be to destroy the effect of its wit and wisdom. But it can be said that he insists that if the structure corresponds to its technical purpose it will generally look well; if the layout is good it will look good.

MM. Six and Grauwin describe recent installations of industrial application of gas in the Lille region; a large re-heating and annealing furnace by the (English) Incandescent Heat Co., Ltd., capable of treating charges of 60 tonnes of steel, a tunnel oven for industrial bakery, known as the 'Turnus' oven by Werner, of Stuttgart, capable of baking 1,100 loaves of bread per hour, and a large bank of burners for the gassing of textiles.

M. de la Pomélie writes on some developments in the design and operation of mechanical producers. These followed attempts to increase the output of producers by increasing the pressure of the air-steam injection which necessitated the use of the 'dry grate.' The pilot plant is described with diagrams and the main dimensions and an interesting photograph of the base casting of the revolving grate, a flat round plate equipped with two raised radial cutting edges with openings below



Grate plate 2.6 m. diameter, with air inlets. (The coned steps above for distributing air and steam are removed).

through which clinker is evacuated. Automatic control by temperature variation at several points in the depth of the fuel bed has already been described. The control of clinkering is similarly effected. Reference is made here to the arrangement for the speed control of West's Gas Improvement Co.'s 'Hot gas producer.' The operation of the pilot plant is said to be encouraging.

Parallel with the above experiment is that with an arrangement for automatic clinkering developed with the Ste. Heurtey

applied to a battery of Marischka producers installed by the Cie. Gle. de Construction de Fours at Villeneuve-la-Garenne. Thermocouples are run up to the apex of the cone of the revolving grate, covered and protected by a thimble of stainless steel. The speed of the grate is thus controlled by the temperature some 10 cms. above the apex of the grate. The article is fully illustrated by diagrams and charts.

M. J. Coq, Engineer to the Industrial Physics branch of the Research Department of Gaz de France, contributes a study of tank heating by means of gas burned in immersed tubes, with turbulent flow. Experiments were carried out with a tank of water, but obviously the method has many applications to the heating of liquids or even the melting of metals with a low fusion point. Details of the burner and tubes are given; the latter were arranged in one or two horizontal loops near the bottom of the tank, terminating in a vertical length serving to evacuate products of combustion.

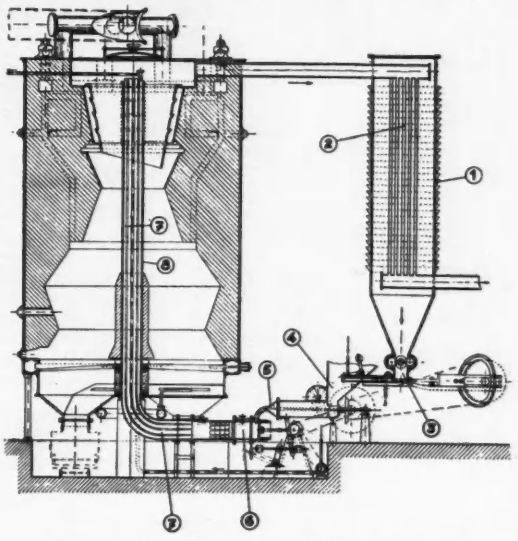
Combustion in a tube generally gives rise to a noise so deafening as to be intolerable even in industrial applications. Causes of the noise are the combustion itself and the resonance of the tubes. The first is reduced by the long flame realised in these experiments. But the resonance of the immersed tubes remained sufficient to cause extinction of the burner. Satisfactory results appear to have been obtained elsewhere by the use of an ordinary silencer. In these experiments excellent results were obtained by a reduction of the area of exit of the products of combustion; for instance, the exit from a tube 50 mm. dia. was reduced to 26 mm. dia.

The experiments confirmed that heating by immersed tubes with gas burning in turbulent flow can be easily realised (which was known already), but also that the efficiency is high. Complete combustion was obtained in all cases with 5% excess air. The length and number of tubes can be readily adjusted to the requirements. The best results are obtained with gas and air under pressure at the burner; under these conditions the operation of the burner is perfectly silent and safe. This method of heating combines qualities highly appreciated in industry; high rate of heat transmission, efficiency, flexibility, simplicity of installation and operation, robustness and length of life of tubes and burners. It should find numerous applications in the industrial use of gas.

M. L. Herenstein writes a short note on piping interior installations for propane. 'Thanks to its high calorific value, to its low viscosity and the pressure at which it is generally distributed, propane, in spite of its high density (1.5) can be conveyed in tubes of diameter about one half that necessary for the delivery of an equal number of calories (therms) in coal gas.' The absence of condensable constituents renders precautions as to fall of pipes unnecessary. It is without action on the usual metals, but it dissolves all fats and greases, attacks natural rubber and by reason of its low viscosity is very liable to leak. Methods of jointing, particularly of copper tubing, are described together with the necessary equipment of tools.

Official regulations are now promulgated governing the sale of gas from long distance pipe lines. It will be appreciated that these are necessary in France where prices are settled by negotiation between Gaz de France and the communes supplied, regulated from time to time by the gas index referred to above. A Commission has been set up on whose advice the Minister of Industry and Energy will fix technical conditions to which long distance transmission must conform in the matter of safety. The question of storage capacity of these long pipe lines is also a matter which concerns the Industry.

In the September issue of *Chimie et Industrie* Dr. Georges Kimpflin discusses the application of gas made by peat in the manufacture of lime, cement, bricks, and tiles. He reviews the position of peat relative to other fuels in Russia and other countries, including Great Britain. Peat must be gasified for its use to be economically profitable. Hitherto the difficulty has been the high cost of dehydration. This author describes a producer for the gasification of peat without preliminary desiccation. The producer proper, however, is preceded in the apparatus by a drier containing 24 hours supply of peat with 70% moisture content. The centre of the silo (1) is occupied by a nest of tubes (2) which are traversed by hot water vapour from the producer. From the bottom of the silo the peat is fed to a press (3) which eliminates more of the water by compression and passes it to a mixer (4) in which it is 'de-fibred' and thence to a cylinder (6) with piston which forces the mass upwards through a nest of nine tubes (7) contained in an outer envelope (8) and discharging into the top zone of the generator. In the envelope oil is circulated to ensure controlled even heating of the tubes rising progressively to a temperature about 95°C. The peat arrives in the top, drying, zone of the generator chamber with a humidity of 60% and at 95°C., and leaves it with 35 to 40% moisture. The lower zone is the producer proper, gases from which are taken off below the drying zone. Attention is particularly directed to the set of tubes (7). The



Producer for wet crude peat (Migeon's patent).

charge is delivered at the point (5) in the form of a stiff paste. The tubes ensure that the temperature is progressively raised to 95°C., at which it acquires a certain consistency, and that it is delivered to the producer in pieces of more or less uniformity. If this were not achieved the peat would fall in dust and gasification would be impossible. The article is illustrated by an excellent diagrammatic drawing and results are given. These show that from the calorific point of view one ton of peat may be equivalent to 0.565 tons of coal. Applications of the gas in the several industries are discussed.

Rebate for Belfast Consumers

BELFAST gas consumers are to receive a rebate of 4½d. per 1,000 cu.ft. on accounts during the quarter ending March 31, 1952, for ordinary consumers, and during the last two clearances of the financial year for prepayment consumers.

Commenting on the favourable financial position, Mr. Hyslop (Engineer and Manager of the Corporation Gas Department) says this was chiefly the result of increased yields of coke and substantially increased revenue from chemical products following the installation of new plant at the gasworks. In addition, carbonising results had been more favourable than was anticipated. The rebate will represent a saving of approximately £33,000.

Mr. Hyslop, in another report, records that the works producing capacity had been reduced by 26%, representing nearly 5 mill. cu.ft. of gas a day, because it had been necessary to take Yorkshire coal in place of Scottish coal. The plant had been designed for carbonising chiefly low coking coal and that, formerly, over 50% of the supply had been Scottish coal. That had now been reduced to under 20%. Unless there was an early prospect of improvement in the coal supply position it would be necessary to take drastic steps.

The United Kingdom Trade Commissioner in Ottawa reports that Canadian visitors to the United Kingdom have been informed by some retail shops that goods purchased here and sent to Canada by post are admitted duty free. Articles purchased by tourists and sent to Canada by post are *not* entitled to exemption from Canadian customs duties and taxes. The Board of Trade draws attention to the Personal Exports Scheme, under which Canadian visitors purchased goods to the approximate value of £200,000 in the first six months of this year. By this arrangement, goods purchased here are sent to the buyer's liner or aircraft and as accompanied baggage, are entitled to a concession of 100 dollars' worth of goods duty-free.

SWANSEA'S DISTRIBUTION SCHEME

By J. H. NUTTON, M.S.M.A., M.Inst.F.,
Distribution Officer, Swansea and Carmarthen Group, Wales Gas Board.

From a paper to the Wales and Monmouthshire Junior Gas Association (South Wales Section).

IN Swansea it was the factor of density which, during the war, served to make so terribly effective the many attacks by enemy aircraft and particularly the three-night blitz of February, 1941, when the heart of the town, over an area of approximately one mile square, was so heavily damaged by bomb and/or by fire, that the area had subsequently to be flattened. It was this flattened area which became the responsibility of the Swansea Corporation to redevelop, and it is in regard to the work of redesigning a new system of gas mains within this area—which had to be carried out by the Swansea undertaking—that this paper has been prepared.

I do not think that when Hitler sent his 'planes to Swansea he had any intention of creating a pattern for a better Swansea, but, in effect, that is what he did. A new Swansea town centre has been designed. Boldness has been the theme of the planners, and the roads and pavements are spacious.

The new thoroughfare of Kingsway with its dual carriageway 50 ft. wide, and pavements 15 ft. wide, leading to the big roundabout at the junction of College Street, has replaced the old Northampton Place and Heathfield Street, each of which had a road approximately 25 ft. wide, and pavements approximately 6 ft. wide.

New Plan for Gas Supply

Only a small proportion of the full scheme for the new reconstruction work has, as yet, been completed as far as the road works are concerned, and before the completion of the final scheme many more of the existing streets and roads will have lost their old identity within the new town centre reconstruction works. All these streets had, or have, gas mains laid in them, and the abandonment of these mains has necessitated a new plan for gas supply within the areas affected.

Generally the gas mains within the old town centre were laid within the roadway. On many occasions they created problems in the narrow thoroughfares. The width of the new roadways, together with the re-alignment in many cases, and the usage by the highway authorities of reinforced concrete for road surfaces, has given us the opportunity for dual mains in all roadways, together with the advantages of laying the mains within the pavements.

The positions for gas mains in relation to other public services were agreed to by the Swansea undertaking and the Swansea Borough Engineer, and generally follow the suggestions contained in the report of the Joint Committee of the Institution of Civil Engineers and the Institution of Municipal and County Engineers on location of underground services (July, 1946). This Committee worked in co-operation with the Institution of Gas Engineers among other bodies.

Briefly the recommendations were that the mains should be laid in the following order, from the highway boundary to the kerb-line:—

(i) Electricity (nearest the boundary).
(ii) Gas.
(iii) Water.
(iv) Telecommunications (nearest the kerb).

Only in impossible instances has this pattern been deviated from in the new work, and it is another instance where close liaison between the undertaking's personnel and the various engineers from the Borough Engineer's Department has paid dividends.

From 1841 until 1924 the manufacture of gas was carried out at the Oystermouth Road works of the undertaking, and the distribution system was organised and developed with that works as the supply base. The Morriston works (5½ miles from the Oystermouth road works) was first commissioned in 1922, and from 1924 the manufacture of all gas has been carried out at that works.

At the time of the cessation of gas manufacture at Oystermouth Road, the statutory area of supply of the undertaking was 50 square miles, and although not all this area was supplied with gas, 190 miles of mains had been laid. The system served areas at distances from the Oystermouth Road works of 7 miles to the west, 4 miles to the east, and 6 miles to the north, and there were certain long 'legs' of more or less untapped trunk mains.

The Oystermouth Road works is at sea level. Some of the outlying areas are at approximately the same level, but are reached only after passing levels of approximately 560 ft. above sea level, and in consequence the maintenance of reasonable average pressures over the whole district has always been difficult.

Because the distribution system had been developed from the Oystermouth Road works, and because three gasholders having a total capacity of 2 mill. cu.ft. are stationed there, it was necessary to connect the Morriston works (one holder, capacity 2 mill. cu.ft.), with the Oystermouth Road works, and a 12-in. H.P. steel main was laid in 1922. Certain provisions were also made to supply the areas adjoining the Morriston works with low pressure gas from a 24-in. main ex Morriston works governor with appropriate enlargement of existing mains and with suitable interconnections.

Division of System

In due course it became practicable to divide the whole distribution system into two sections, one section being served by the Oystermouth Road holders (fed by the link from Morriston) and the other section being served by the Morriston holder.

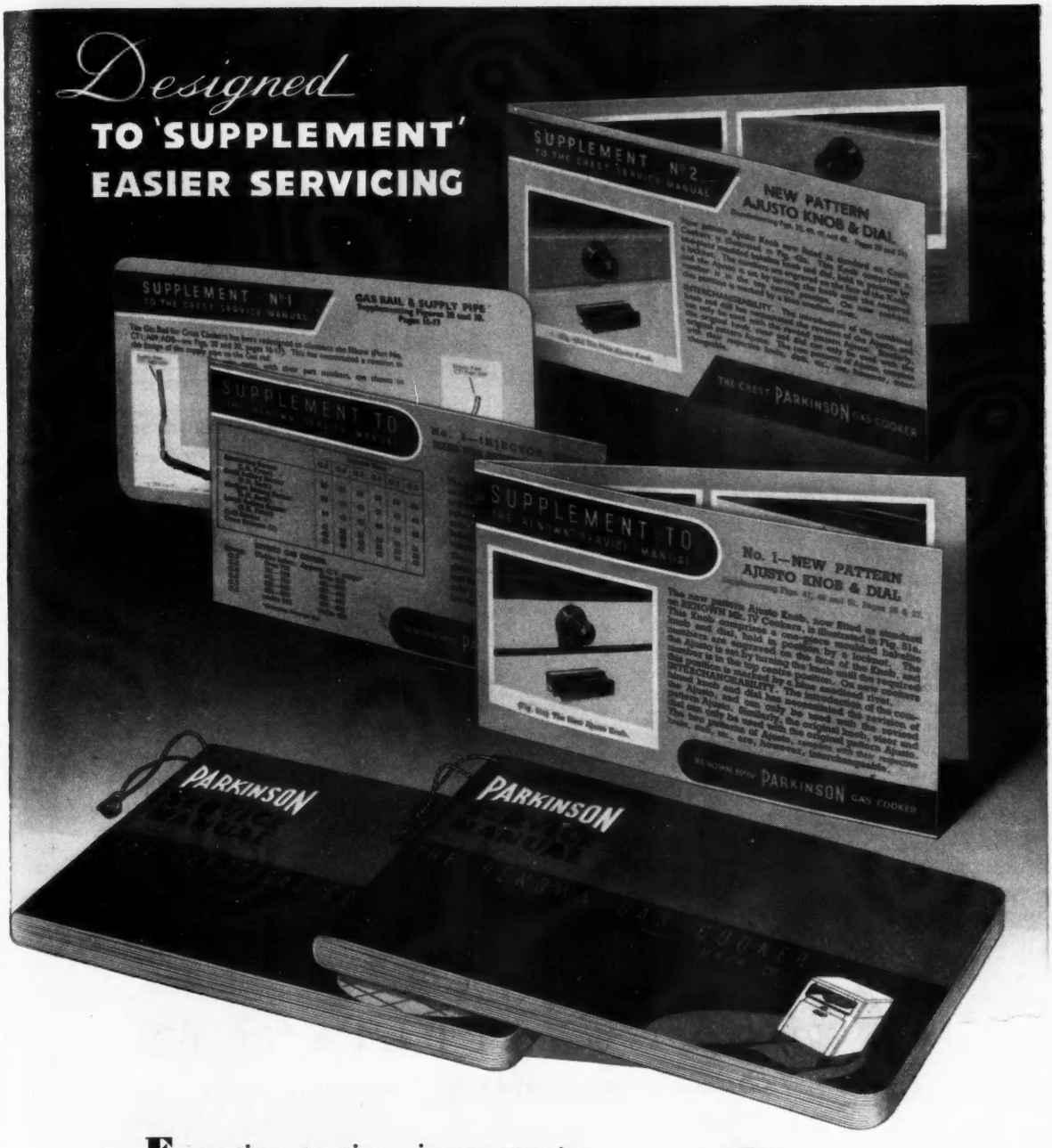
This division of the distribution system into two sections proved of incalculable value to the undertaking during the blitz periods. Maintenance of the supply of gas to the public was rendered easier and the work of pumping flooded mains clear of water through the pressure of gas on both sides of the water was relieved of much of the attendant danger.

At present approximately 54% of the total gas sent out is within the area north and east of the line supplied either through the governors at the Morriston works or through the high pressure link main, and the remaining 46% through the governors south and west of the line, at Oystermouth Road works.

Of the total gas used for industrial purposes, approximately 95% is used within the area north and west of the line supplied by the Morriston works governors, and approximately 5% through the governors south and west of the line supplying the Swansea area.

Almost all existing and future industrial demands will be within the area supplied from the Morriston works governors. This in itself is a pattern created not by the undertaking but by the action of the local authority in planning for the siting of industry within Swansea. The area supplied ex Oystermouth Road works will be mainly domestic and commercial, with a small industrial gas loading.

Redevelopment work altered the grouping and character of consumers within the town area. From office records it



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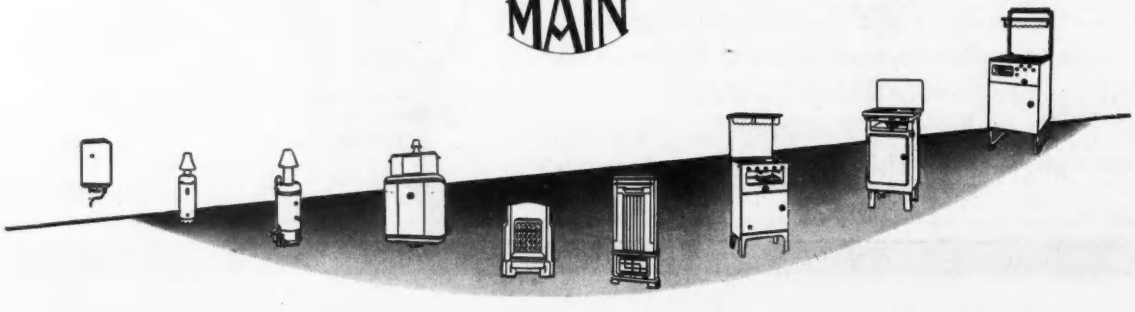

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was known where and when the heavy and light consumptions of gas within the old town were to be expected, but in the new grouping of the various business premises such information could be of only limited assistance in the determination of estimates of the gas requirements within the new area. Various methods of approach to the problem of new area gas requirements were considered, and it was decided to pursue investigations based on gas consumptions per square foot of floor area. The Borough Engineer and Surveyor's Department claimed that the new layout, despite wider roads, roundabouts, etc., would provide the same floor area as the old layout. This claim was made on the basis that floor area of premises (of various storeys) was 1¾ times 'built on' ground area in respect of old (existing or blitzed) buildings, and could be rated at 2½ times ground area in respect of new buildings.

	Ground Area. sq. ft.	Floor Area at 1¾ Storeys. sq. ft.
Inner zone	420,500	736,000
Outer zone	2,950,300	5,163,000
	3,370,800	5,899,000

Having checked and agreed this claim concerning floor area over a 'spot' area (approximately the inner zone of the new development scheme) the total annual gas consumptions of the area (427 consumers) for the year prior to the blitz of 1941 was ascertained and found to be 63,669 cu.ft. (288 therms) per annum per consumer, and 36.9 cu.ft. per annum per sq. ft. of floor area.

The outer zone of the complete development scheme contained property much less important—*viz.*, warehouses, cottages, etc. 'Spot' tests within this outer area indicated an average gas consumption of 17.5 cu.ft. per annum per sq. ft. of floor area.

Further, it was considered reasonable to pursue the investigation on a basis of an annual gas consumption of 50 cu.ft. per sq. ft. of floor space, which rate, it was understood, represented the average rate at 15 new trading estates situated throughout the county. The old weighted average consumption per annum per sq. ft. floor space of both the inner and outer zones was approximately 20 cu.ft. Adoption of a basis of 50 cu.ft. per annum per sq. ft. of floor area would therefore provide an increase of 150% over this weighted average.

If by virtue of changed character of buildings, tenants, etc., the consumption of the outer zone rose to that of the inner zone, the rate of increase provided by the 50 cu.ft. basis would be 35.5%.

On this basis of an annual consumption of 50 cu.ft. per sq. ft. of floor area within both inner and outer zones, the total annual consumption was computed and contrasted with 1940 consumptions (see Table 1).

TABLE 1.

		OLD LAYOUT		NEW LAYOUT	
	Floor Area sq. ft.	Rate	Annual Consumption	Rate	Annual Consumption
Inner zone ...	736,000	36.9	27,186,900	50	36,800,000
Outer zone ...	5,163,000	17.5	90,352,500	50	258,150,000
	5,899,000	19.92	117,539,000	50	294,950,000

Having obtained an estimated annual consumption for the whole new area, it was necessary to break it down to maximum rate of flow, and the following formulæ were tried:—

(a) Formula used by H. J. Escreet, 'The Design of Distribution Systems to supply Post-War Developments." Inst. of Gas Engineers, 1943.

$$\frac{\text{Annual consumption}}{200} = \text{Maximum day.}$$

$$\frac{\text{Maximum day}}{10} = \text{Maximum hour.}$$

(b) Formula used by C. H. Chester, Swindon, 1945. ('An Interpretation of Integration.')

$$\frac{\text{Annual consumption}}{255} = \text{Maximum day.}$$

$$\frac{\text{Maximum day}}{6} = \text{Maximum rate.}$$

(c) Swansea experience—

$$\frac{\text{Annual consumption}}{290} = \text{Maximum day.}$$

$$\frac{\text{Maximum day}}{6.86} = \text{Maximum hour.}$$

$$\frac{\text{Maximum hour} \times 115}{100} = \text{Maximum rate.}$$

Swansea experience—maximum rate × maximum hour at 115%—confirmed approximately the Swindon formula

$$\frac{\text{Maximum day}}{6} = \text{Maximum rate.}$$

Conversion of the Escreet maximum hour to the maximum rate by 115/100 factor gave results approximating Swansea results. There was thus not too big a difference between the maximum rate results from any of the three formulæ.

Using the Swansea experience, the estimated annual consumption for the full developed area, 294,950,000 cu.ft., was converted into maximum demand rate.

Year.	Day.	Hour.	Rate.
294,950,000	1,017,069	148,260	170,499

For purposes of comparison, the annual consumption of the inner and outer zones under pre-blitz conditions, 117,539,400 cu.ft., was similarly converted to maximum demand rate.

	Year.	Day.	Hour.	Rate.
Inner zone ...	27,186,900	93,748	13,666	15,716
Outer zone ...	90,352,500	311,560	45,417	52,229
Total ...	117,539,400	405,308	59,083	67,945

With a knowledge of the gas demands within the redevelopment area and in the areas adjoining and beyond, and with a knowledge of the supplies into these latter areas from existing mains, it was not difficult to design a mains system to and within the redevelopment area.

In the design adopted there are dual mains (15 in. and 12 in. diameter) within the pavements of the new road leading to the roundabout at the north end of Kingsway. These mains will be continued to the new roundabout to be constructed at junction of the Neath and Carmarthen roads, and will relieve existing main arteries in Wind Street, Castle Street, and High Street, which arteries are somewhat suspect as regards foreign deposits arising from damage by enemy action.

The two 15-in. mains, one in each of the pavements of Williams Street, will continue through to the new roundabout constructed at the west end of the new Kingsway, and thence to Mansel Street in order to reinforce the Uplands, Sketty, Killay, Dunvant, and Gower areas. Interlinking the New South Road and William Street mains, are various other mains varying in size from 10-in. in diameter to 6-in. in diameter, which are to reinforce the town lower area.

The Swansea town centre reconstruction scheme is estimated to take 25 years to complete, and its cost will run into many millions of pounds. In the design of the system of gas mains within this redevelopment scheme we have not 'thought of a number and doubled it,' but have worked on bases which are definite, though maybe not unassailable.

DISCUSSION

Mr. S. G. Meade (President) felt that Swansea had a golden opportunity to put their distribution system in order and was taking advantage of this opportunity.

(*Concluded on page 632*)

ASPECTS OF GASWORKS CONSTRUCTION

By R. F. ROBINSON, M.Inst.Gas E.,
Divisional Constructional Engineer, Watford, Eastern Gas Board.

In this paper to the Eastern Junior Gas Association the author indicates the interdependence of plant design and construction costs, emphasises the need for the maximum economic return on capital expended, and illustrates some of the problems encountered in constructional work.

THE present-day cost of constructing a complete gasworks is of the order of £214,000 per mill. cu.ft. per day. Depreciating on the basis of an average life for plant of 40 years, and computing the interest rate on the written down capital year by year, the capital and depreciation charges together amount to 4.3% of this figure. Assuming that to cover repairs 15% of plant must be kept in reserve, and that the maximum day is $2\frac{1}{10}$ of the annual sales, capital and depreciation charges amount to no less than 1.93d. per therm.

If the net cost of gas into holder is 9d. per therm, mathematically the scope for economy as between capital charges and manufacturing charges is in the ratio of 1:4.6; in practice the economies to be obtained from good design and construction are immeasurably greater, since savings are not limited to the first cost of plant, but are also substantially reflected in operating and maintenance costs. The order of saving that can be effected by choice and design of plant largely depends on site conditions and size of unit, and is difficult to evaluate, but the author suggests that the difference in overall cost of gas into holder between a works which is well designed and one which is indifferently designed may well be as much as 1½d. per therm.

While we are all aware of the increase in cost of plant, it may not be generally appreciated that present-day costs are of the order of 280% of those in 1939. Table I gives a typical analysis of the cost of a complete new works of 15-18 mill. cu.ft. per day. It is necessary to add that foundation conditions, size of units and the proportion of coal gas to water gas can account for large variations in these figures, which are therefore to be used with considerable reserve.

Table I

Analysis of Capital Cost of 15-18 mill. cu.ft. per day New Works.

Plant	Cost per mill. cu.ft./day £	% of total
12 mill. cu.ft./day carbonising plant ...	88,000	41.0
Coal gas ancillary plant	32,600	15.2
Gasholders (12 hours' storage) ...	32,200	15.1
Two 3 mill. cu.ft./day C.W.G. plant including relief holder and ancillary plant	13,300	6.2
Boilers, cooling towers, water softeners, steam and water mains, electrical systems, generators, and electrical substation	11,000	5.0
Coke handling plant	9,400	4.4
Compressors, boosters, governors and houses, instruments, gas mains, and gas valves	8,400	3.9
Offices, canteen, repair shops, etc. ...	8,100	3.8
Railway sidings and locos.	3,800	1.8
Coal handling plant, including tipplers	3,800	1.8
Land, fences, roads, yards, and drains	3,800	1.8
Total cost of new works on new site ...	£214,400	100.0%

To ascertain the most likely field for economy the first step is to dismiss such obvious items as gas mains, tar and liquor systems, buildings, gasholders, ancillary plant, roads, etc., the careful design of which, though most necessary, is unlikely to effect major economies.

We are thus left with the following in order of magnitude:—

Plant	% of total
1. Carbonising	41.0%
2. Mechanical handling (sidings, coal and coke plants)	8.0%
2. Carburetted water gas	6.2%
4. Steam and power system	5.0%

In the author's experience it is seldom advisable to consider any one of these items separately. All are inter-related and so great is the choice of plant and so various the layouts possible that there is clearly no layout which will be ideal in all respects. One which provides the best handling of materials often results in an inconvenient arrangement of gas connections; one which provides good accessibility and working conditions frequently requires an expensive system for mechanical handling of materials; and one which meets all other requirements frequently renders a compact and efficient steam and power system impossible. The most successful design is that which provides the cheapest overall cost of gas into holder—*i.e.*, materials and wages cost plus maintenance cost plus capital and depreciation charges—and fulfils the additional requirements of good working conditions and the minimum of nuisance to surroundings.

The two most important factors in achieving this are undoubtedly the correct choice and layout of mechanical handling plant, and the careful design of the steam and power systems. As an example of the latter, it has been estimated that in the case of a works distributing 60% of the gas by high pressure, the whole of the power requirements may be generated by waste heat steam and all the process steam required obtained from the passout turbines of the generators —all prime movers, except exhausters, being electrically driven and all process steam utilised at a pressure of 10 lb./per sq. in.

The running cost including capital charges shows an estimated saving of no less than 0.6d. per therm compared with the conventional works power system. This is on the assumption that all plant is at work and, while in practice some steam would be required from solid fuel boilers on account of load variations, the effect of this on the overall running cost would be very slight.

Layout of Plant

It is more difficult to put exact values on savings effected by the layout of plant and mechanical handling when viewed broadly, and in preference to involved attempts to do so, the author would refer to a hypothetical design for a works of 15 mill. cu.ft. per day, designed with the following factors in mind.

(1) Maximum mechanisation of all processes.
(2) Minimum movement of materials.
(3) Use of belt conveyors wherever possible.
(4) Adequate facilities for unloading and putting coal into stock, and reclaiming from stock to carbonising plant.
(5) Minimum amount of handling plant to convey coke from retort house to bunkers or stock, and to supply boilers and water gas plant.
(6) Arrangement of carbonising units to facilitate resetting a bench at a time.
(7) Grouping plant to allow of compact and efficient steam and power systems.
(8) Grouping of plant to facilitate collection and use of

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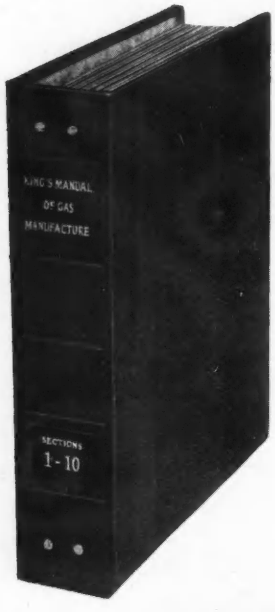

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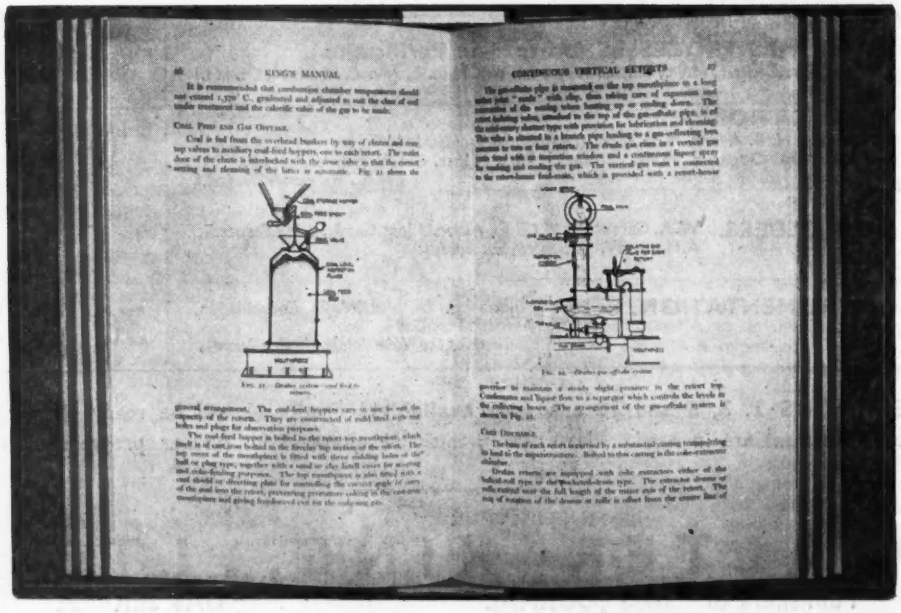

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exhaust steam for process, and cooling water circulation over a central cooling tower, with steam using plant, boilers, and cooling tower centrally disposed.
(9) Minimum area of roads and pavings.
(10) Adequate siding facilities to enable 50 truck trains to be received and despatched.
(11) Minimum of nuisance to surrounding property by noise, smell, and dust.
(12) Ample coke stocking facilities.
(13) Good working conditions and ventilation.
(14) Good accessibility for maintenance.

There is little doubt that the ready availability of labour the low price obtainable from breeze, and the ideal of the lowest possible capital account, were responsible in the past for what would in other industries be regarded as appallingly low standards of mechanisation and of fuel and power utilisation. The changed conditions of today make economic schemes embodying the features outlined above, and such a scheme would go a long way towards achieving optimum overall efficiency.

Buildings

Another aspect, which is becoming increasingly important, is the design of buildings. It has become fashionable to house gas-making plant in buildings of architectural distinction, in direct contrast to the plain utilitarian design commonly encountered pre-war. This is a laudable attempt to remove the stigma attached by the lay Press and music-hall comedians to the old style of gasworks. It may well be, however, that when the years have added to these edifices their quota, reduced but persistent, of the dirt inseparable from gas manufacture, the general effect will not be noticeably different.

Aesthetically the policy is justifiable. One may well ask whether it is so financially. Much, of course, depends on site conditions and the degree of finish, but apparently a modern building of pleasing external appearance can be constructed for approximately 10% more than a plainer building of the old style. Contrast, for example, two compressor houses of approximately similar size. In one let us consider that the compressors are at ground level, the gas connections constructed in pits below floor covered with chequer plating, the walls plastered and finished in paint and distemper, and the floor red tiled. The roof may be covered with asbestos sheeting boarded on the underside. For the other, costing rather more, as mentioned, let us have regard to a building in the modern style with the compressors elevated and the connecting pipes housed above ground within the building. The machinery is serviced from a steel stage floor covering two-thirds of the area of the building and interior decoration consists of off-white bricks, tiled round the door reveals, and quarry tiled floor. The roof, of flat design, consists of pressed steel plates covered with double Rubberoid sheeting surrounded by parapet walls.

The cost of constructing pits with chequer plate covers to receive gas connections, valves, etc., can frequently be nearly as great as that of increasing the height of the building and elevating the machines.

Foundations

Most engineers are familiar with settlement cracks in buildings, out-of-level gasholder tanks, and pulled joints in gas mains due to varying degrees of failure of foundations and sub-soil. Remedial measures are difficult and costly, and it is now the practice to enquire much more closely into sub-soil conditions than was done in the past, when a trial hole or two and a visual examination of the ground was often deemed sufficient.

The maxim 'It is better to be sure than sorry' was never more truly applied than to foundation work, and since soil mechanics and ground exploration have become almost exact sciences which can now be applied comparatively cheaply, it is clearly false economy to grudge the small expense in any case where doubt exists. As an example, in the case of a ¼ mill. cu.ft. gasholder the cost of two borings and examination of the sub-soil to a depth of 35 ft. amounted to less than 0.2% of the total cost.

The method adopted by the author in dealing with foundation problems is as follows:—

(1) Consult geological maps of the locality to determine the general make-up and stratification of sub-soil, standing water level, soil drainage, etc.
(2) Consult any known records of foundations on adjacent sites, and if the ground is uniformly satisfactory a choice of foundation may be made without further investigation.
(3) If ground is variable but a good foundation such as a thick gravel bed is known to exist a few feet below ground, borings should be made with a post-hole borer to determine the depth of the gravel layer. This method is extremely easy and cheap and may well save a large sum by enabling a correct choice of foundation to be made before the work is commenced, and by avoiding expensive additions to contract such as extra depth and concrete.
(4) Where ground is bad—*e.g.*, sand, clay, or water-logged ground—deep bores with specialist equipment are made. Only by this means is it possible to determine accurately the type of foundation which will be best and cheapest.
(5) From a study of the information thus obtained, estimates are made of the cost of those types of foundation deemed suitable, and tenders are then invited for such alternatives as appear likely to be competitive.

Elstree Gasholder

An interesting example of difficult site conditions was encountered in the construction of a new gasholder required at Elstree. The site is extremely congested and the only possibility was to construct the new holder, which is ¼ mill. cu.ft. capacity and 111 ft. 6 in. diameter, on the site of an existing holder with an underground masonry tank approximately 20 ft. deep to the annulus. The demolition of this holder represented in itself no difficulty, but borings disclosed that the sub-soil consisted of London clay which was badly weathered near the surface. Samples were taken at various depths and it became apparent that a reliable foundation could not be found at less than 10 ft. below the surface due to the liability of the clay above this depth to consolidate in the fissures and cause settlement. This opinion was confirmed by the fact that an existing holder (constructed in 1926) about 100 ft. away, which was built upon foundations resting on the clay at a depth of about 7 ft., has tilted approximately 2 in. A further difficulty lay in the heavy sulphate content of the clay, requiring precautionary measures to be taken to minimise the effect of attack upon steel and concrete.

With the possibility of settlement in the clay, even at a depth of 10 ft. or more, the problem is complicated by the fact that the new foundation would be resting partly on the old holder tank and partly on previously unloaded clay. Differential settlement with consequent tilting is therefore more than probable over the life of the holder. It was therefore thought desirable to carry any form of slab or raft foundation to the full depth of the existing holder tank amounting to about 20 ft. The question of sulphate attack made this proposition somewhat less attractive as regards a steel tank which would require protection against corrosion by a buffer layer of concrete at least 2 in. thick around the whole of the periphery. Alternatively the tank could be constructed in reinforced or pre-stressed concrete with sulphate resisting cement. A further alternative lay in piling the site and constructing a foundation slab at ground level to receive a steel tank.

The choice of foundation, from both an engineering and an economic aspect, poses a nice problem. To solve it, full information had to be obtained regarding the various costs involved. To summarise the position, the possibilities were as follows:—

(1) A spirally guided holder in a steel tank based on a concrete slab foundation 20 ft. below ground, the steel tank protected by Guniting with light reinforcing welded to the tank.
(2) A holder in a reinforced concrete tank at 20 ft. below ground level.
(3) A holder in a pre-stressed concrete tank at 20 ft. below ground level.
(4) A holder in a steel tank on a concrete slab at ground level supported entirely on piles.

The piling design had to allow for the fact that no support whatever could be given to the slab from the ground due to the high compressibility of the top soil.

The costs were found to be as follows:—

(1) Holder	£40,500
Steel tank	£8,000
Excavation for new tank including demolition of existing masonry tank as necessary, and provision of concrete raft 20 ft. below ground level.	£17,350
Reinforced Gunite protection round steel tank sides	£1,400
TOTAL	£67,250
((2) Holder	£40,500
Reinforced concrete tank constructed at 20 ft. below ground level including all excavation, demolition, and back filling round periphery, including bitumen coating to resist attack from sulphate ...	£24,630
TOTAL	£65,130
(3) Holder	£40,500
Prestressed concrete tank including sulphate resisting cement	£27,793
TOTAL	£68,293
(4) Holder	£40,500
Steel tank	£8,000
Piled foundation	£15,950
TOTAL	£64,450

From these figures it will be seen that the steel tank on piled foundation is the most economic proposition. The price for piling is based on a study in soil mechanics of the samples from the bores, and the safe loading of the piles is calculated from these considerations. Four hundred piles, each 30 ft. long (40 ft. long under old tank), and 12 in. square or 15 in. diameter, are required. In practice it is anticipated that test piles, which are yet to be driven, will indicate that a smaller penetration than 30 ft. will be sufficient to obtain the necessary set, and it is the author's experience that as piling proceeds the ground tightens up and the set is obtained at progressively less depth of penetration.

EQUIPPING OF LARGE KITCHENS

By ALEC HUGHES, Radiation (Large Cooking Equipment) Ltd.

In this paper to the Midland Junior Gas Association the author emphasises the wisdom of close co-operation between the gas engineer, architect, ventilating engineer, and the specialist manufacturer.

THE 1914-1918 war gave a fillip to large-scale catering, when many works canteens were then created. During the last war the growth was phenomenal, due to the statutory obligation for the provision of canteens in connection with all works employing 250 or more persons. Quite a number of smaller firms, quick to see the advantage gained by this legislation on their own labour force, acted accordingly. There is still vast scope for development, and it may be as well for us to consider together some of the many spheres of activity, but at this moment a word of caution is advisable. Although we should have our ideals, and, indeed, must have them, these will need to be related to the facts of the situation, and one of these facts is the shortage and high cost of fuel. It is therefore imperative that obsolete and wasteful cooking plant be replaced by modern and efficient appliances, thereby reducing the consumer demand for fuel.

Fuels and Ancillaries

Food is mainly prepared by submitting it to heat. Town gas, butane-propane gas (*i.e.*, bottled gas), electricity, solid fuel, oil, steam, high pressure hot water, or a combination of these fuels may be employed. The present paper deals primarily with gas apparatus. It is recognised, however, that the specific conditions underlying each enquiry demand thorough investigation. Let me cite, as a hypothetical instance, the case of a factory which uses steam for the processing of certain basic material. If, without taxing the existing boiler and installation, steam can be spared for the steam and water jacketed pans, tea and coffee making apparatus, steaming ovens, and hotclosets, it is right to follow this course, and employ another fuel for roasting, baking, grilling, and frying.

If steam is available for cooking, ascertain what pressure will be obtainable at the points where the various items are to be installed. The voltage and periodicity of the electric supply must be known, also the the character of the water. Drainage and ventilation must also receive consideration when planning and equipping large kitchens. The efficient and neat housing of all service pipework will enhance the appearance of the installation, and it is essential to see that supplies of gas, steam, water, and electricity are adequate.

The National Health Service is ensuring that every one of our hospitals throughout the country will be reviewed by regional boards specially constituted to assess their needs. In this connection, therefore, a demand has arisen for modern kitchens and the replacement of all obsolete cooking plant. For the school meals service the cooking is frequently done in a central kitchen and the cooked food is distributed, in insulated containers, to the schools. Boarding schools, and colleges present their own problems.

To weigh up any project one requires to know the number of persons for whom catering is to be undertaken, and, when a hotel or restaurant is under review, the type of menu. For the works canteen, the number of sittings, their timing, and the diners to each must be known. The type of service, whether cafeteria or waitress, must be agreed.

Well designed sinks, with ample draining boards, are essential, and when used for washing up each compartment will require not less than 10 gal. of water hourly at 140°F.

Apparatus Available

The size and number of the items of cooking apparatus will depend upon the number of persons served, and the following quantities may be of interest. It is stressed that they are for normal (unrationed) times, and are thus not entirely applicable to present-day conditions.

Soup	½ pint per person
Fish	8 oz. „ „
Meat	6-8 oz. „ „
Potatoes	8 oz. „ „
Green vegetables	6 oz. „ „
Puddings	6 oz. „ „

If a seven course meal be served, these quantities are reduced by approximately one-third.

There are various types of gas ranges, some internally, others semi-internally or fully externally, heated. It is usual to allow 8 to 10 lb. of meat per cu.ft. of oven space, taking the door opening and effective depth back for calculation. Some people favour the hotplate totally enclosed. In some such hotplates the flames from the burners impinge on a refractory and produce intense radiant heat. The chef can use omelette pans, and put them directly into the flame without smothering the gas. This solid hotplate, for heavy continuous duty, gives the greatest measure of stability for pots and pans of all sizes. On the other hand, the open hotplate is advisable for lighter or intermittent needs, and it is normally wise to have at least one of this type.

For those establishments dealing with a large number of joints large roasting ovens are available in batteries of two or more, and they are heated internally and have enclosed gas supply and injectors.

Where space permits, ovens only on elevated stand or stands with independent boiling tables are highly recommended, for stooping is avoided, the apparatus is at a convenient working level, and the floor is extremely accessible for easy cleaning.

For general utility, vegetable pans of cast iron, bowerbarffed, and with baskets, have stood up to hard wear and tear, but are losing their popularity. Die cast pans of a special aluminium alloy are just appearing, and have proved highly successful. Copper pans for vegetables are not recommended as they are liable to get scratched and, unless kept really clean, may set up verdigris. A dependable estimate for capacity is 1½ lb. of greens and 4 lb. of potatoes per gal. Water jacketed pans, of tinned copper, are intended for custard, milk or porridge.

Use of Steamers

Puddings, potatoes, root vegetables, and fish can be cooked in the steamer, but not green vegetables, as they lose their colour. It may be taken that 11 lb. of root vegetables per sq. ft. of tray area, or 20 to 24 lb. per cu.ft. of oven space, will be reliable. Puddings may be steamed in cylindrical shaped containers, and when cooked cut up into portions, or alternatively may be cooked as individual puddings in open type utensils. In every sqare foot of tray area there is room enough for 24 portions when steamed in the roll tins, or 12 to 16 if in 3 in. basins. When open type utensils are employed for puddings they should be closed with grease-proof paper, but nowadays when this paper is in short supply the general practice is to place a sheet metal plate over the containers, in which case care should be exercised to ensure the plate does not extend right across the compartment. Allow 4½ lb. of fish for each cubic foot of cooking space within the steamer.

In deep fat frying the same fat is used repeatedly and the modern fish and chip range is thermostatically controlled, designed specialy for kitchens in hotels, restaurants, canteens, or institutions. Constructed, as many are, on the unit principle, suites can be built up to fill any changing need. Two baskets to each pan and a useful rack to the back and side screens or canopy are advisable. The thermostatic control keeps the fat at frying temperature and prevents overheating. All drained fat is conveyed in channels back to the pans. Various types of pan cover are available; these conserve the heat and will help to keep the fat clean when the fryer is not in operation. For practical purposes the capacity can be assessed as 3 lb. of fish or potatoes per square foot of pan area. The average cooking time may be taken as 7 to 8 min.

The latest grillers have insulated taps at the side, well away from the burners, to avoid overheating. The solid fluted brander in the Savoy 'C' design enables simultaneous grilling of both sides of meat at one time, and allows fat and juices to drain to a cooler region, avoiding smoking or charring. The heat-resisting frets are very speedy, the smallest size (with two burners—known as No. 18 'C') will deal per hour with 360 slices of toast 4 in. square. Admirable for steaks, chops, or mixed grills, this griller will also salamander—that is, brown the top or finish off some cooked foods and improve their appearance. The inside effective height is 9 in., but if if a single duty apparatus is required for toasting only there is the Palace toaster 4½ in. high inside. The Savoy Minor, developed for snack bars, and complete with a three-egg poaching pan, may be placed on the service counter, or quite apart, on a high or low stand.

The New World Confector pastry oven, externally heated, with two or three compartments 10 in. high inside, or the four deck model, with an inside height of 6½ in., provides an even distribution of heat throughout the compartments, and will produce pastries, 'smalls,' bread, cakes, and meat pies.

Hot Service Counter

Hot service counters can have a plain top, or a top containing carving wells and bain maries. When space is restricted there are taller types of hotclosets, with doors on one or both sides, as preferred. Cafeteria counters, with hot and cold sections, and the front faced with decorative material and recessed floor plinth, constitute an effective and artistic suite which can harmonise with any scheme of decoration. The hot section is suitably insulated to take this special panelling.

As to tea making, an allowance of one pint per diner is adequate, as this will cover any loss of water in rinsing and spillage, and making in pots. For coffee and milk one-sixth pint of each per person will be necessary. Apparatus for preparation and storage of these beverages, available in various designs and of reputable manufacture, deserve specialist attention.

There is also the vital question of a plentiful and constant supply of hot water for washing-up and general purposes. The bulk storage water heater is ideal for the smaller type of kitchen where the washing-up is done by hand, but the gas boiler for boosting water already fairly hot or a steam calorifier, producing water at about 190°F., is needed when dish-washing machines are employed. Adequate thermal insulation of the pipework is essential.

Heavy and exacting as the demand is upon the installation, it is imperative to the consumer, and to the prestige of the gas undertaking and the manufacturer, that the cooking plant and ancillary equipment are maintained in good working order by periodical inspection and renewal of any necessary parts.

Ventilation and Hygiene

The need for keeping kitchen smells strictly to the precincts of the kitchen is apparent, for there is nothing calculated so to spoil a good appetite as a premature smell of a mixture of foods. If the kitchen is not surrounded by other buildings, and is roomy and lofty, with spacious windows and a good opening to an efficient stack with strong pull, ventilation by natural means may suffice. Mechanical ventilation is more positive and the ductwork for such a system is installed to remove steam or vapour, and also to keep the kitchen reasonably cool. Extract canopies can be fixed over ranges, boiling pans, fish fryers, and steamers. Openings will probably be necessary at high level, either in the walls or ceiling, or in the connecting ductwork, to take care of general extraction from the kitchen.

It is of some advantage if the greatest volumes of is likely to be felt. Inlet ducts may conceivably be brought down to breathing level and provided with outlets adjustable as to volume and direction of air flow. Solid impurities present in the air can be removed by the provision of suitable air filters, or an air washer, and in some installations additional benefits have been gained by the application of ozone treatment to the air. Where the dining room is on the same

level as the kitchen, special care must be taken to prevent odours entering. Hence, if inlet, as well as extract, ventilation is provided for the kitchen, more air has to be extracted than is coming in, so that a positive current from the dining room is maintained.

DISCUSSION

Mr. L. Gibson (Stourbridge) raised the question of steam cooking and its effect on food. He considered the matter of interest having regard to the increase in the use of pressure cookers, and wondered if the flavour was not affected by steam.

Mr. Hughes said these cookers were excellent in their way—and for some foods in particular. He felt the whole question was one largely of personal taste.

Mr. H. R. Hems (Birmingham) referred to the vital need for conserving of gas consumption and the desirability, for example, of some sort of spring-loaded boiling burner on the hotplate so that as soon as the vessels were removed the gas would be cut off automatically.

Mr. D. J. Ward (Birmingham) referred to the lighting of ovens and hotplates with the use of gas lighters, tapers, matches, or even paper. When he was in Stockport he was shown a cooker with a tap which automatically lighted the burners.

Mr. Hughes said he knew that members all recognised that heavy duty cooking plant had to sustain arduous and most exacting conditions; in the larger works it was often in operation almost continuously throughout the day and night. The first charge upon the manufacturer was to ensure the absence of sensitive components which might easily go wrong and add to the maintenance cost. He deplored the use of paper for igniting the gas, as charred remains were frequently littered about on the floor, in the ovens themselves and often between the burner housings. Tapers, in his view, were preferable to paper.

Mr. J. A. W. Stretton (Wales Gas Board) said that in the old days they used to have a lot of advice about domestic cookers and their use, but he believed that service was discontinued in 1939. He stressed the increase in demand for large scale cooking plant consequent upon recent legislation, and was of the opinion it would be in the interest of the industry as a whole, the users and manufacturer alike, if training grounds for cooks were set up. Again, in so many instances, the space was assigned for the kitchen before either the architect or the specialist manufacturer was consulted. This gave rise to many difficulties in planning due to the lack of space.

Mr. Hughes observed at one time Radiation Ltd. had a demonstration staff for both large and small scale catering, but it had not been reconstituted since the war. As to the area and the siting of the kitchen, it was indeed vitally important for everyone directly and indirectly concerned to get together in the initial stages. Mr. Hughes considered that there was a growing tendency for this joint discussion.

Mr. W. J. Parsons (Birmingham) suggested the bulk storage heater was suitable for all canteens for washing-up purposes and sterilisation.

Mr. Hughes agreed that storage heaters were a reliable solution for the provision of hot water for washing-up. When it came to sterilisation, water around about 190°F. was specially useful and, moreover, the crockery, after immersion therein, would be largely self-drying. It was quite true also, that storage heaters with relay control and thermostat, together with booster, were employed successfully for the provision of water at about 190°F. to a dishwasher.

Mr. Tomes (Stourbridge) enquired as to the most suitable shape and size of a kitchen.

Mr. Hughes said a square or rectangular kitchen tended to help in layout and that in assessing the area needed, the figures cited in the survey were given as a guide but were not always practicable. Hence, one had to strive to make the best of the space available and achieve comfortable and effective working conditions.

Mr. J. Foxton (Cheltenham) enquired why manufacturers constructed ovens to which the cooks had to stoop to the maximum extent. He assumed most food was cooked by radiant heat and suggested an oven burner of the surface combustion type.

Mr. Hughes stated in reply that, given enough floor space, both ovens and hotplate could be elevated on separate stands to eliminate stooping. But that took up floor area which on so many projects was not available; thus the range and hotplate combined was the only solution. If the oven (on a combined range and hotplate) was raised too much from floor there would be an outcry that the hotplate was not at a convenient working level for heavy pots and pans. In gas ovens cooking was predominantly by convected heat; radiant heat played only a very minor part. Hence, the suggested surface combustion burner was unsuitable. In a grill, on the other hand, the radiant heat burner was very desirable, but the design must be carefully chosen so that the spread of reasonably even intensity was achieved over as large an area as possible.

Mr. R. B. Watkins (President) brought the discussion to a close by calling upon **Mr. D. J. Ward** (Senior Vice-President) to propose, and **Mr. J. Palser** (retiring President) to second, a vote of thanks to Mr. Hughes, who suitably responded.

SWANSEA'S DISTRIBUTION SCHEME—(*Concluded from page 625*)

Mr. T. D. Barker (Llanelly) noted that the gas mains had been positioned according to the recommendations of the Institution of Civil Engineers. While it was necessary to follow a consistent line, it was also necessary that the depths should be controlled; and he wondered what arrangements were made in this respect. The Borough Engineer at Llanelly insisted on a cover of 3 ft. in the carriageway, so that, at times, mains in the pavement had to be laid as low as 3 ft. in order to allow for the falls when crossing the road. In Swansea, dual mains, 12 in. and 15 in. in diameter, were being laid, and he asked to what pressures mains were tested, how they were protected and what arrangements had been made for subsequent inspection. He also noticed that allowances had been made in the sizes for 150% increase in consumption, and he felt that this would mean a lot of work by the sales department.

Mr. Nutton, replying, stated that the depth was normally 2 ft., but occasionally it was less and then they would cover the main with a light reinforced concrete mattress. The mains were originally tested to 5 lb. per sq. in., but were now tested to the pressures recommended in the Codes of Practice of the Pipes Committee.

Mr. C. L. Singleton (Chepstow) wondered whether there would not, at times, be some congestion with all four services in a 15 ft. pavement, particularly where there were electricity or G.P.O. junction boxes and inspection pits. He asked whether the floor areas taken in the design data included corridors, basements, cloakrooms, etc. He felt that Mr. Nutton would have been more correct to have called his formula 'Swansea Estimates' rather than 'Swansea Experience.' What were the types of main laid?

Mr. Nutton stated that no congestion had occurred in the 15 ft. pavements, that the total useable area—*i.e.*, including corridors, basements, and cloakrooms—was taken in his estimate and the formula was based on records of gas sales in the Swansea area. It was based on experience and was not a mere estimate. The mains were spun iron with mechanical joints.

Mr. K. E. Tiddy (Carmarthen) remarked that the maximum hourly consumption was a function of the maximum load depending on whether it was commercial, industrial, or residential. In a residential town the $\frac{\text{maximum day}}{10}$ would give a reasonable figure for the maximum hour whereas the $\frac{\text{maximum day}}{6}$ would give a reasonable figure for the maximum hour in an industrial or commercial area.

Mr. Nutton agreed that the formula must be adapted to

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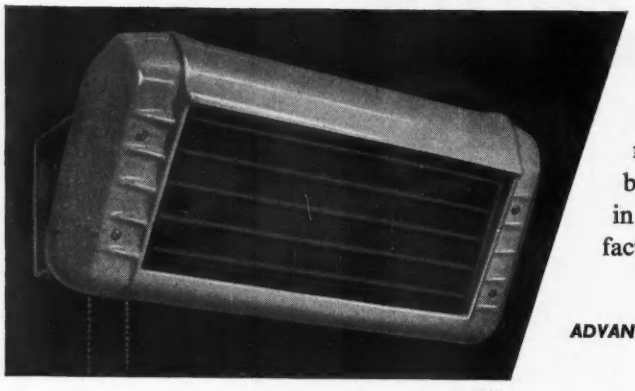

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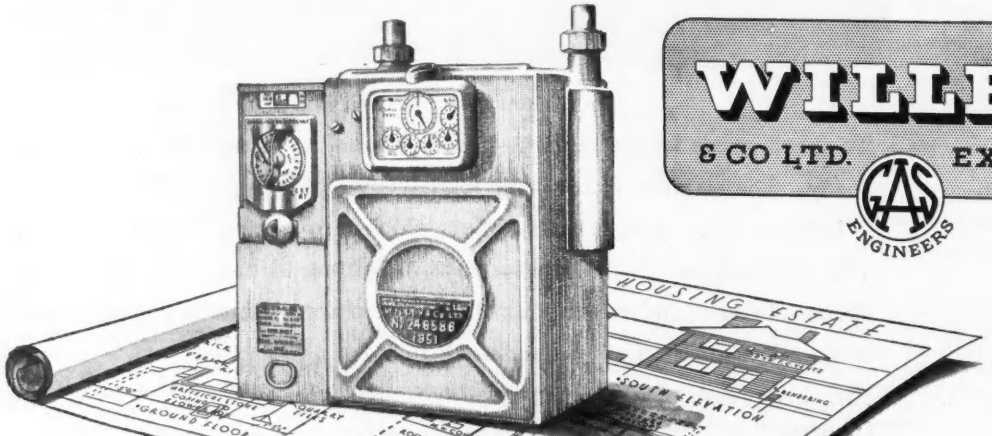
THOMAS DE LA RUE & CO. LTD. (Gas Division), Imperial House, 84/86 Regent Street, London, W.1.

Northern Area: 4 Albert Square, Manchester 2 ★ *Midlands Area: Portobello Works, Warwick* ★ *South Western Area: "The Ferns", Chewton Mendip, Som.*



★DOMESTIC and INDUSTRIAL METERS

of every capacity for high efficiency and long life

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the town in question. The 288 therms per annum was the actual consumption of the area specified in 1940.

Mr. R. J. K. Shepherd (Neath) asked whether any protection was given where the main crossed the road. Also, in calculating the size of the main, what were the maximum and minimum pressures used under present conditions and what would they be in future conditions?

Mr. Nutton stated that as the roads were not made when the mains were laid, it was not necessary to break any concrete surfaces. On some crossings, a concrete mattress had been laid above the main. They had found no difficulty with falls. He felt that the pressure drop in the town should be in the region of $\frac{3}{10}$ in., and while opinion was divided on the maximum pressure on a system he thought that one designed to give 6 in. at the works and 3 in. at the end of the district was ideal.

A vote of thanks was accorded to Mr. Nutton on the proposition of **Mr. T. E. Tyrrel** (Cardiff), seconded by **Mr. S. Armitage** (Bristol).

COMPANY MEETINGS

MALTA AND MEDITERRANEAN GAS COMPANY

Annual General Meeting

THE Annual General Meeting of the proprietors of the Malta and Mediterranean Gas Company was held at 5, Great Winchester Street, London, E.C.2, on November 23. Mr. Arthur M. Paddon, M.I.C.E., Chairman of the Company, presiding.

Mr. G. MURRAY BURTON, M.A., F.C.A., Managing Director and Secretary, read the notice convening the meeting and the report of the Auditor, Mr. William Cash, F.C.A., and the Chairman reported that there was a quorum of the proprietors present.

The CHAIRMAN, in moving the adoption of the report and accounts for the year ended March 31, 1951, said the proprietors would see that the Directors' report dealt more completely and with greater particularity than usual with the affairs of the Company. That was by reason of the fact that everything in its administration was gravitating towards the termination of its concession, which was due in a year's time. That had necessitated certain measures being taken in protecting the Company's position, involving the valuation of its assets, which was a necessary step before they could attempt to deal with the position which they would reach twelve months from now.

The valuation had disclosed a very satisfactory state of things, as indicated both in the Directors' report and consequently in the balance sheet. As intimated in the third paragraph of the report the Directors were pleased to state that the fixed assets in Malta had now been completely amortised—the reserves representing those assets being utilised in conducting the general business of the Company.

The operations of the Company during the past year showed a very marked similarity to those of the previous year. Such divergencies as there were, were small, and the result was at least equally satisfactory. Coal and oil and all those other things ancillary to the Company's operations had cost more, and on the other side of the accounts there had been a comparatively small increase in the receipts of the Company. The last item on the left hand side of the Revenue Account showed a profit carried to Profit and Loss Account of £9,802, which was over £1,100 larger than for the year before.

Turning to the Profit and Loss Account, when all the different necessary demands had been satisfied there was an increase of over £1,000 in the figure shown. When it came to the Balance Sheet, it was a very intricate document and the proprietors should be congratulated on the fact that it had been compiled by a very skilled accountant with every possible care for the Company's interests. To select some of the figures which were indicative of the Company's position, it would be seen that the authorised capital was £150,000, but there was only £44,310 employed in the management of its affairs. If they looked on the other side they would see that the investments of the Company—he was leaving out the assets for the time being—amounted in the aggregate to £55,488. That was a figure that was distinct and separate, standing as a separate account as against the capital employed by the undertaking. He thought the proprietors would agree that that was a very favourable position.

Turning to the top right hand side of the Balance Sheet they would see that fixed and long term assets as a result of a recent valuation amounted to just under £150,000. That was the ground on which the ultimate position of the Company would be determined, whatever the future might be.

For some years—for three or four years at any rate—they had been very actively concerned with what might eventuate on the termination of their concession. They had afforded every possible facility to the Government of Malta to meet them and to deal with whatever situation might arise. Their efforts in that connection, however, had not been reciprocated and it had been almost impossible to elicit from them any response leading to the consideration of the future position. Perhaps one reason for that was the fact that the political situation in Malta was very disturbed—he could think of no part of the world in which the political situation was not disturbed at the present time.

They had taken every possible measure to safeguard the interests of the Company whatever might be the outcome of the final period of its existence but he was not able to say what the position would be in twelve months' time, although they had meticulously considered every detail of the business in preparation for what he might call a post mortem or resurrection. That was all he was able to say at the present time and he would therefore content himself with moving the adoption of the report and accounts.

Mr. FRANK H. JONES, M.I.C.E., seconded the resolution, which was carried unanimously.

In answer to a question by Mr. R. H. BLAKESLEY, the Chairman said he could not say what would happen if they did nothing when the Company's concession expired. The question of continuing the supply of gas would rest with the other side, because it was the Government of Malta which in the original case issued the concession. On the question of new capital expenditure in the event of a further concession being obtained, the Chairman said it was extremely difficult to make any statement at present.

In reply to Mr. C. H. RUTTER, the Chairman said that as matters stood at present the concession was due to terminate on December 1, 1952. The Company's valuation had been very thorough and it was not contemplated that there would be a further valuation next year.

The CHAIRMAN proposed the re-election of Sir George Evetts, O.B.E., M.I.C.E., as a Director of the Company. He said he would not conceive of anybody in the gas industry today so thoroughly qualified to support the responsibilities and duties of a Director as Sir George Evetts. They were extremely fortunate in having secured his assistance and his guidance and it would be of great advantage to the Company to retain his support.

Commander HYDE C. BURTON, F.C.A., seconded, and Sir GEORGE EVETTS briefly acknowledged his re-election.

On the proposition of Mr. BLAKESLEY, seconded by Mr. RUTTER, a formal resolution was passed fixing the remuneration of the Auditor.

The CHAIRMAN said nothing now remained but to express satisfaction and gratification at the conduct of the Company's affairs in Malta. They had been very complicated, and they had in Mr. E. J. Finucane, the Manager, a very able officer who had transacted all the affairs of the Company and carried out their policy with very great skill. It was a very different matter doing that in Malta from doing it from some office in the

provinces over here. The Company would like to thank him for his services, as represented by a very good report, and they would like also to thank the other officers of the Company. They had in Mr. G. Murray Burton a gentleman who had several capacities; he was Managing Director and Secretary. In fact he was very largely the undertaking, and they all knew how much they owed to him in the past in respect of the readjustment of their capital to their circumstances.

Sir GEORGE EVETTS said he had pleasure in seconding and confirming all that the Chairman had said.

On the proposition of Mr. RUTTER, seconded by Mr. BLAKESLEY, a hearty vote of thanks was accorded to the Chairman and Directors.

The Chairman, in response, said that in recent years the Directors' duties had become more exacting and the policy of the Company had to be directed in many different ways from the formal meetings of the Board. He could assure the proprietors that the Directors were assiduous, intelligent, and modest.

OXLEY ENGINEERING CO., LTD.

Increase in Sales

THE fifteenth ordinary general meeting of the Oxley Engineering Co., Ltd., was held on November 29 at Leeds, Mr. H. SAVILLE, M.INST.GAS E., the chairman, presiding.

The following is an extract from his statement circulated with the report and accounts for the year to June 30, 1951:—

The balance of trading account shows an increase from £118,703 to £144,274 in the current period. Owing to the larger provision for income tax and profits tax which is necessary in the present accounts, the net profit of the parent company amounts to £29,617, against £35,909 last year.

During the past 12 months the parent company have had a very satisfactory trading period, the sales and the value of work in progress increasing over the corresponding figure last year.

Although the parent company's order book is in a very satisfactory position, we are experiencing difficulties in obtaining adequate supplies of steel, and now that the rearmament programme is more in evidence, we can, as I stated last year, only hope that our supplies will be maintained.

Our works and outside erection staff have been consistently fully employed in the manufacture of our main products of electrically welded gasworks plant, chemical plant, storage tanks, etc. During the year we have continued to carry out work abroad on our welded products. It is shortly our intention to carry out certain building alterations and improvements, which, in the future, should contribute materially to improving our production facilities.

Subsidiaries' Progress

Our subsidiary company, Thomas Dryden & Sons, Ltd., have again had a satisfactory year, and like ourselves they have a full order book. During the past year, while there has been a slight reduction in the value of the work in progress, the sales of their products have increased. Here again certain building alterations are to be carried out.

The trading results of A. & W. H. Bury (Darwen), Ltd., have, during the year, shown a marked improvement, the average weekly tonnage output being considerably increased with a resultant increase in sales. The market for this subsidiary company's products has been widened and your directors have given a considerable amount of time to the affairs of this company with a view to obviating the difficulties which were encountered in the financial year ended June 30, 1950. It gives me great satisfaction to record that in the past year this subsidiary has made a small net profit against a substantial loss last year. Referring finally to the small subsidiary company of Chas. Rawson (Leeds), Ltd., there has been no trading of this company during the past twelve months.

Net Profits and Dividend

The net profits of the group after providing for taxation amount to £44,876, against £39,188, and the amount carried forward of the group is again increased to £116,320, against £87,550 last year. The profit of the parent company available for dividend is £70,030, compared with £68,313 last year.

When considering the rate of dividend which your directors should recommend for the past 12 months, several considerations had to be taken into account. In the first place it is essential, in these days of increased labour and materials costs, to retain in a successful business a proportionately larger amount of working capital to finance contracts. It was also necessary to consider the possibility of the limitation of dividends introduced by the Chancellor of the Exchequer becoming compulsory by law. A further circumstance for consideration was the issue to shareholders during the year of a bonus issue of £50,000, thereby increasing the company's capital to £250,000, upon which the dividend had to be calculated. After some consideration it was decided to recommend a dividend of 12½%, less tax, on the larger capital, which will absorb £16,406, against £16,500 last year, leaving a balance of £53,624 to be carried forward, against £40,413 last year.

Very Good Prospects

The trading prospects of our group of companies for the next 12 months are very good indeed, and we are confident that we shall be able to satisfy our customers and retain their valued goodwill. I have pleasure in moving the adoption of the directors' report and accounts, and the payment of a dividend of 12½%, less tax.

In conclusion I wish to place on record our appreciation of the willing cooperation of our staff and employees both at Leeds and its subsidiary works. I would like to make special mention of your managing director, Mr. S. Stansfield, who has again earned our gratitude for the efficient discharge of his duties.

The report and accounts were adopted.

Permac
METAL-TO-METAL JOINTING MATERIAL

Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints in Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil, benzol, ammonia, etc.—screw pipe or flange.

Instant full pressure when the joint is made

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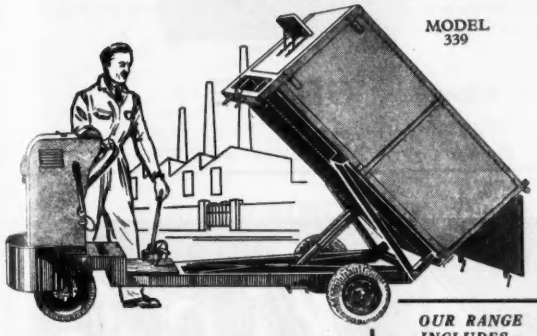
"Wrigley"

3 h.p. HYDRAULIC TIPPER

The time you start to economise . . . . is the time you start to use 'WRIGLEY'"

MODEL 339



This model is designed with an extra large steel body to deal with heavier and bulkier loads. The top-hinged tailboard permits easy unloading. Fitted with a sturdy Hydraulic tipping ram. Load capacity 15/20 cwt. Body measures 5 ft. 3 in. x 3 ft. 4 in. x 2 ft.

OUR RANGE INCLUDES:-

MOTOR TRUCKS, TUGS, TRAILERS, 2, 3 and 4 WHEEL HAND TRUCKS and TROLLEYS, AND SACK TRUCKS

FULL DETAILS ON REQUEST.

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Metolite REGD.

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MODEL NO. 8511

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All surfaces are smooth and the corners rounded. The burners and grids lift out for washing.

BEAUTIFULLY FINISHED
Burners, grids, sides, drip-tray and splash back are all finished in hard wearing vitreous enamel. (Standard colours, cream with green sides and black grids.)

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The dimensions are only: Width 16½". Depth 11". Height 8" (Height with Splash Back and Plate Rack, 22½").

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May be used as a portable appliance; easily connected with flexible tube.

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A Gas appliance of outstanding design and quality. Its construction conforms to the very high standards already set by Crossland products and has been approved by Gas Undertakings. The response of those who have already examined this appliance proves that once again Crosslands have produced *the right job at the right price.* Take advantage of this quick selling popular line. NOW!

MODEL NO. 8510

MODEL 8510 *complete with grill pan* LIST PRICE £5.19.8

MODEL 8511 *with Splash Back, Plate Rack and Grill Pan* LIST PRICE £8.7.0

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Driving and Conveyor Chains of the best quality; made of Ley's Celebrated Blackheart Malleable Iron.
ALSO COMPLETE CONVEYORS AND ELEVATORS

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LARGEST MANUFACTURERS OF GAS MAIN BAGS.
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Gas Bags for Repairing Mains

PATENTEES OF THE
DENMAR BAG
Impervious to Main Liquor and Climatic Influences.

Round or Cylinder Shape.

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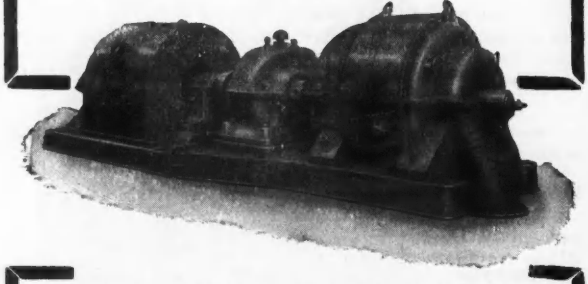

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PUBLISHERS' NOTICE

The "Gas Journal" is published every Wednesday, price 1/3d.; by post 1/5d.

Subscription Rates: Home and Empire :- 52/- per annum ; Foreign :- 60 - per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words) - minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep x 7" wide; block screen 120.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS OFFICE: 10, Union Street, Birmingham.

NORTHERN MANAGER: W. Q. Foster, 33, St. Helens Road, Harrogate. 'Phone: Harrogate 84291.

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In Every Ship of the Royal Navy

APPOINTMENTS VACANT

WALES GAS BOARD

PONTYPOOL UNDERTAKING.

RELIEF SHIFT SUPERINTENDENT.

APPLICATIONS are invited for the position of RELIEF SHIFT SUPERINTENDENT at the above Undertaking.

Candidates should preferably have had experience on Woodall-Duckham Continuous Vertical Retorts, and should have had technical training in all gasworks ancillary plant and equipment. Preference will be given to the Candidates holding the Institution of Gas Engineers Higher Grade Certificate.

The salary will be within Grade V—Administrative, Professional and Technical—of the National Joint Council for Gas Staffs—Provincial 'A' £425-£505 per annum plus housing accommodation, rent free, which will be provided by the Undertaking. The successful candidate will be required to pass a medical examination.

Applications, stating age, qualifications and experience, with two recent Testimonials, should be posted to the undersigned not later than fourteen days after the appearance of this advertisement.

J. POWDRILL, M.B.E.,
General Manager.

Wales Gas Board,
Pontypool Undertaking,
Hanbury Road,
Pontypool, Mon.

WALES GAS BOARD

1. GROUP TECHNICAL ASSISTANT—
CAERNARVON GROUP.

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT to the Caernarvon Group of Undertakings.

Applicants should have had all round experience in carbonisation and the manufacture of carburetted water gas, with particular reference to complete gasification in Tully Plants, and should hold the Ordinary Grade Certificate of the Institution of Gas Engineers in Gas Engineering (Manufacture).

Candidates should be qualified by training and experience to undertake technical supervision of gas manufacturing processes within the Group of Undertakings. Ability to drive a car is a desirable qualification.

The salary will be in accordance with Grade A.P.T. VB (£410-£490 per annum). The successful applicant will be required to pass a medical examination and will be subject to the provision of any superannuation scheme which the Board may introduce.

Applications, stating age, training, qualifications and experience, should be posted to reach Mr. J. R. Wood, Caernarvon Group Chairman, Gas Works, Bangor, Caerns., not later than December 22, 1951.

2. MAINS & SERVICE FOREMAN—
MID-WALES GROUPS OF GAS UNDERTAKINGS.

Applications are invited for the position of WORKING MAINS & SERVICE FOREMAN to the Mid-Wales Groups of Gas Undertakings of the Wales Gas Board.

The post is graded under the Intermediate Grades Agreement VB (£375-£420 per annum). The successful applicant may be required to pass a medical examination.

Particulars and forms of application are obtainable from the Engineer and Manager, Wales Gas Board Aberystwyth Undertaking, Park Avenue, Aberystwyth, to whom applications must be sent not later than December 22, 1951.

WALES GAS BOARD

CHIEF ACCOUNTANT'S DEPARTMENT.
INCOME TAX ASSISTANT.

APPLICATIONS are invited for the above permanent appointment at a salary of £1,000 per annum.

Applicants should be fully conversant with the law, practice and procedure relating to income tax and profits tax, and have extensive knowledge thereof as applied to the gas industry or similar public utility organisation.

The person appointed may be required to assist generally in the work of the department, and a recognised accountancy qualification, and/or experience of public utility accountancy, will be desirable but not essential.

The successful candidate will be required to pass a medical examination and, subject to any protected superannuation rights, will be required to subscribe to such superannuation scheme as the Board may adopt.

Applications, furnishing personal details and particulars of experience and qualifications, with the names of two referees, should be sent to the undersigned to arrive not later than two weeks after the appearance of this advertisement.

C. B. MAWER,
Secretary.

1/2, Windsor Place,
Cardiff.

NORTH WESTERN GAS BOARD

BLACKBURN GROUP.
SENIOR SHOWROOM ATTENDANT—
BLACKBURN SHOWROOMS.

APPLICATIONS are invited for the above position at a salary within Grade A.P.T. VI (£455-£535 per annum).

Applicants must have had experience of Showroom supervision and preference will be given to holders of the Institution of Gas Engineers' Certificate in Gas Salesmanship and Consumer Service.

The successful applicant may be required to pass a medical examination and to subscribe to such superannuation scheme as the Board may adopt.

Applications giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the General Manager, North Western Gas Board (Blackburn Group), Cardwell Place, Blackburn, within fourteen days of the publication of this advertisement.

NORTH THAMES GAS BOARD

THE following Drawing Office Staff are required in the Chief Engineer's Department.

1. JUNIOR DRAUGHTSMEN (3) at Beckton, E.6, Slough, Bucks., and Lea Bridge, E.10. Applicants should preferably have had some experience in the maintenance of gas plant and be conversant with the design of steel structures and lay-out of buildings. Starting salary within the range £295 per annum to £535 per annum, according to age, qualifications and experience.

2. DRAUGHTSMEN (2) at Westminster.
   (*a*) Experienced in the design, layout and detailing of mechanical handling plant.
   (*b*) Experienced in the design, layout and detailing of any of the following:—Coal Carbonising Plant, Coke Oven Plant, By-Products Plant, Pipe Layouts or Steel Framed Structures.

Applicants should be about 30 years of age. Starting Salary within the range £570 per annum to £650 per annum, according to age, qualifications and experience.

All the above appointments are of a permanent nature and pension arrangements will be discussed at interview. Applications, stating age and full particulars of training and experience, should be sent to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, W.8, quoting reference number 79.

(*Classified advertisements continued on Supplement* 4)

APPOINTMENTS VACANT (ctd.)

WANTED. A qualified person having experience in the manufacture of incandescent mantles. Write, with details regarding experience and terms, Box 8925, Frost-Smith Advg., 64, Finsbury Pavement, London, E.C.2.

EXPERIENCED FOREMEN required for Gas Mainlaying Contracts in various parts of the country. Good rates of pay, hours, etc., to No. 9985, *Gas Journal*, 11, Bolt Court Fleet Street, London, E.C.4.

DESIGNER required for Gas Cookers by large Midland Manufacturers. Must have knowledge technical requirements and Fuel efficiency. Apply No. 9986, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

EASTERN GAS BOARD

WATFORD DIVISION.

INDUSTRIAL GAS ENGINEER.

APPLICATIONS are invited for the position of an INDUSTRIAL GAS ENGINEER in the Watford Division. Applicants should have had experience in the design, construction and installation of industrial and commercial plant covering a range of representative industries and should be suitably qualified by examination.

The commencing salary will be not less than Grade XI A.P.T. ("Fringe" Metropolitan) according to experience. The successful candidate may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications stating age and giving full particulars of education, training, qualifications and experience, should be sent not later than December 22, to the General Manager, Eastern Gas Board, Watford Division, Radiant House, Clarendon Road, Watford, Herts.

SCOTTISH GAS BOARD

GLASGOW DIVISION.

GLASGOW DISTRICT.

VACANCIES FOR TECHNICAL ASSISTANTS.

APPLICATIONS are invited from suitably qualified persons to fill two vacancies on the Technical Staff of Tradeston Gas Works.

Applicants must possess minimum qualifications of the Higher Grade Certificate in Gas Engineering of the Institution of Gas Engineers.

Experience as a Gas Works Chemist and a knowledge of Modern Vertical Retorts and Carburetted Water Gas Plant are essential.

One appointment will be in accordance with A.P.T. Grade VIII, Provincial 'A' of the National Salary Scales (£540-£620 per annum) and the other on A.P.T. Grade VII (£500-£580 per annum). Placing on these scales will depend on experience and qualifications.

Successful candidates may be required to pass a medical examination and subscribe to such superannuation scheme as the Board may adopt.

Applications giving particulars of age, education, training, qualifications and experience, along with the names of two referees, should be received by the undersigned not later than December 19, 1951. Envelopes should be endorsed "Technical Assistant."

D. F. YOUNG,
Divisional Controller.

30, John Street,
Glasgow, C.1.
DMcB/FM.
November 26, 1951.

SOUTH WESTERN GAS BOARD

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Applications stating age, qualifications and experience to be addressed to the Sub-Divisional Manager, South Western Gas Board, Torquay Sub-Division, Hollacombe, Paignton, and received not later than December 31, 1951.

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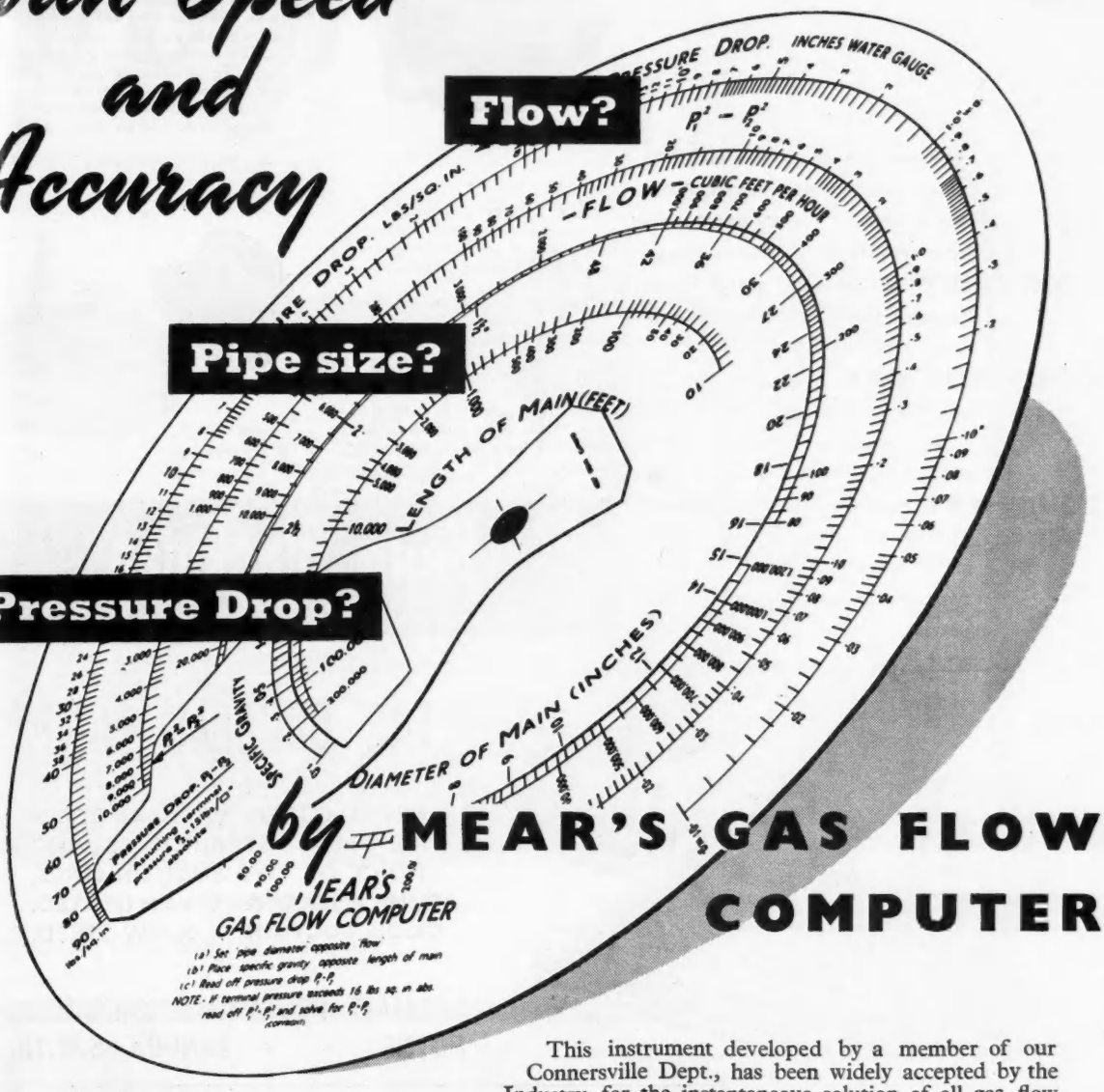

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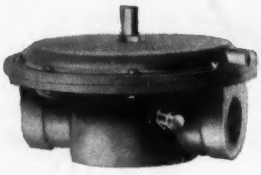

THE SINGLE DIAPHRAGM, SAFETY SHUT-OFF VALVE (*illustrated left*) *automatically closes the gas supply in the event of pressure dropping below a predetermined point. Not until all burner cocks on the outlet have been shut and gas pressure restored is it possible to re-open the valve.*
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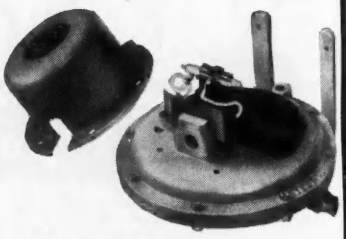

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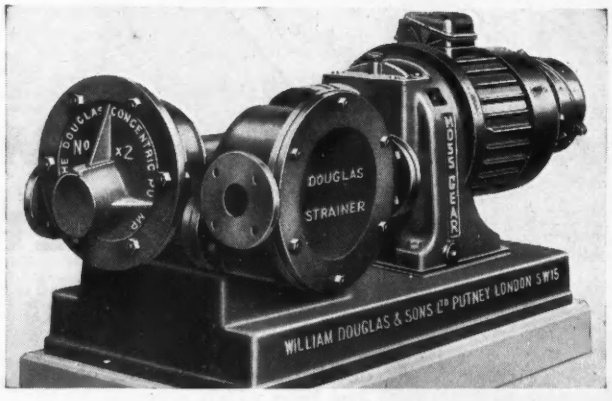

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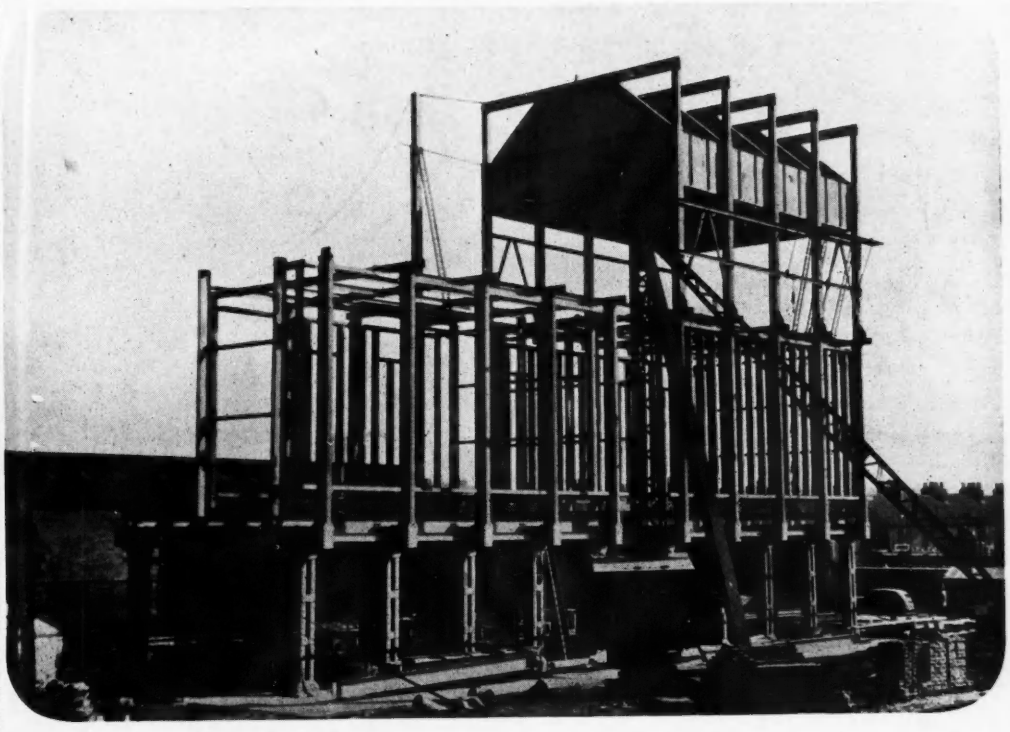

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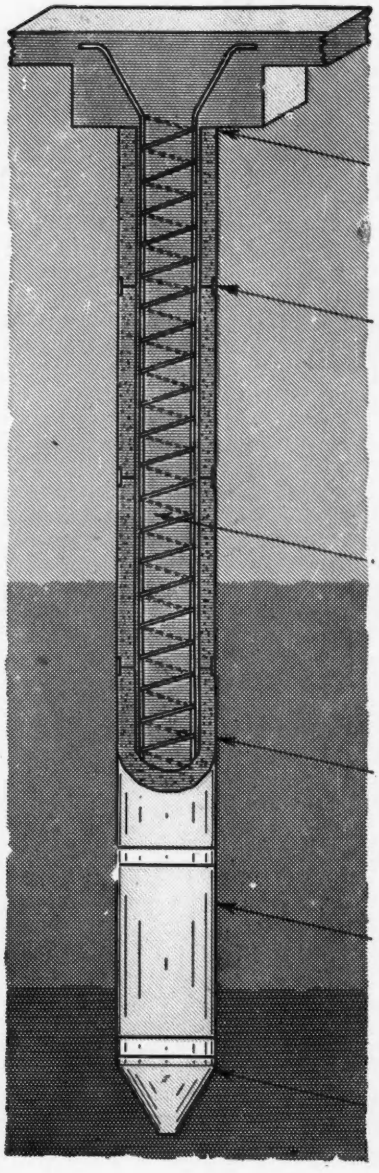

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